

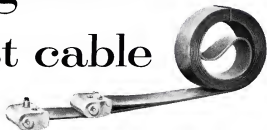
# AVIATION WEEK

A MCGRAW-HILL PUBLICATION

JULY 18, 1955

50 CENTS

## The Story of a coating. a gasket. a hoist cable



**3 interesting new examples of Goodyear's willingness to tackle and solve the small — as well as the large — problems facing the Aeronautics Industry.**

**THE COATING** Here's the coating which could prove to be your ace in the hole when it comes to protecting the vitals of your next aircraft: chloroprene rubber-based, it is self-curing—requires no heat application. Developed by Goodyear engineers, it is already safeguarding radomes and other aircraft exterior sections from the disastrous erosion of sleet, hail and rain. Its uses are almost limitless because it readily weds itself to even the smoothest surfaces, can be brushed or sprayed on — has great resistance to chemicals, including petroleum, caustics and some dilute acids—forms an effective barrier to salt-water corrosion. Also comes as a static coating to prevent static build-up.

**THE GASKET** Are you experiencing failures brought on by the new aromatic fuels? Have you found that conventional aircraft gaskets often swell, shrink, dry out and leach? A Goodyear field man has come up with the answer: a new Platen Gasket. Drawing upon our rubber molding experience, he constructed this gasket "sandwich style" so that the gasket material cannot flow out and fail. Key to the gasket's success is another Goodyear development — a special adhesive, the *only* adhesive which could positively bond the sandwich construction. Isn't this the gasket to assure you a "fuel-proof" fuel system?

**THE HOIST CABLE** Looking for an all-weather cargo hoist that is ideal for sea salvage, one that is unaffected by temperatures of from  $-40^{\circ}\text{F}$  to  $160^{\circ}\text{F}$ , and can be reeled "flat" on a drum? McDonnell Aircraft Corporation—working with Goodyear—has developed a new "flat" hoist cable for helicopter rescue and salvage operations, which can be rolled on a drum, supports loads of 78,000 pounds in fully or partially reeled-out positions. Flexible, corrosionproof, it weighs only 2.10 pounds per foot—has high tensile strength and great fatigue resistance. It has no tendency to twist, curl or distort in cross-section upon application or release of loads. Internal pneumatic and electrical passages protected from friction and damage, give operator positive control from either end of hoist.

If any of these products can serve you—or if Goodyear can serve you in creating new products to bypass problems facing you — then simply write:

Goodyear,  
Aviation Products Division,  
Akron 16, Ohio or  
Los Angeles 54, California



## WIG-O-FLEX COUPLING



flexible union for connecting rigid tubes.

are you interested in weight reduction?

## WIG-O-FLEX COUPLING SAVES 17 POUNDS on B-66B

The new Douglas B-66B delivers 4,400 hp and carries 10,000 lbs. The WIG-O-FLEX Coupling, compared with AN Connections and cut hose. The WIG-O-FLEX Coupling weighs 1/5 as much as the standard AN coupling section it can replace. (See weight chart for exact comparisons.)

### PROVES SUPERIOR FOR PULS. AIR

- Withstands more than 1000 psi burst pressure.
- Accommodates 4" tube flexure.
- Installs locally, 90% lighter.
- Temperature range -65 F to +250 F.

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### Domestic

**Robert B. Bohlen**, 47, president of the *Chicago Paper and Mill Co.*, Hinsdale, Ill., was nominated Deputy Secretary of Defense by President Eisenhower, succeeding **Robert B. Anderson** who resigned.

**Mr. Gen. Albert Boyd** has been assigned to the newly created position of Deputy Commander for Weapon Systems at Headquarters, Air Research and Development Command, Baltimore, Md. **Gen. Boyd**, who commanded the Wright Air Development Center at Wright-Patterson AFB, Ohio, will be given the planning, policies and direction of ARDC's weapon systems effort.

**Bell 47G** helicopter crashed over the side of the Fort of New York Authority's 16-story building in midtown Manhattan July 11 when the pilot tried to take off with the emergency power booster cable still attached to the PNTA craft. Pilot **Maxwell G. Chevrolet** and a passenger suffered serious injuries. The accident is expected to delay further attempts to build a commercial helicopter on West Side Manhattan along the Hudson River.

Airfreight volume nearly has reached the saturation point because of today's high rates. **Henry Tiger Lane**, President **Robert W. Proulx** told the New York Society of Security Analysts last week. "All the airfreight reasons have developed a fair service . . . but at a price so high that only a narrow percentage of the freight potential can afford to pay the rate," he said. "Where we have in the last few years recorded annual gains in airfreight volume of 25% and 30%, the present rate of gain cannot be expected to be more than 3% unless a new approach is taken on our pricing structure."

Loss of control during open tests is blamed for the crash of a North American Aviation F-100A last week, 10 miles east of Philadelphia, Calif. NAA Test Pilot **Robert Hoover** bailed out of the F-100 jet fighter at 33,000 ft. and escaped serious injury. An investigation by Air Force and company officials is underway.

**Capt. R. O. D. Sullivan**, 43, first pilot to make 100 hours-Adelphi flight, died July 16 at Wilmington, N. C. **Sullivan** retired from Pan American World Airways after his Boeing 747 crashed in Kilauea Bay, Portland, in 1942, killing 74 of the 434 persons aboard.



### First View of Lightweight Bell XH-40

Successful, low silhouette of new Bell XH-40 lightweight U. S. Army helicopter development at Ft. Worth, Tex., is revealed in this actual photo of a scale model. The craft was the heaviest model competition in Army history and the first ever seen other than the (AW Feb. 23, p. 14). Company designation is Model 222. With a payload of more than 800 lb., the XH-40 has a design cruise speed of over 300 kt. Aviation Week also reported that the craft would have a 6,000 ft. landing ceiling and 1,400-kt. rate of climb. Designed primarily as a frontier reconnaissance and instrument trainer, the XH-40 will also handle a variety of other missions. Bell's contract calls for preliminary engineering and a mockup of the craft.

Mid-air collision involving a Trans World Airlines DC-8 and a private two-engine Cessna occurred at approximately 300 ft. near Fairfax Airport, Kansas City, July 12. The two-man DC-8 crew, on a routine training flight, said they had no warning of the Cessna's presence. Both planes showed the Cessna were killed. DC-8 suffered some damage to its left wing but made a normal landing.

**Strategic Air Command** will start an annual company competition next year to select the top SAC fighter wing. Prize will be a silver trophy named in honor of the late **Reg. Gen. Jesse A. Lee**, former chief of SAC's Fighter Division and awarded by Republic Aviation Corp.

**Republic Aviation Corp.** and the International Association of Machinists (IAM) reached agreement on a company-paid pension plan for production employees at the Farmingdale, N. Y. plant.

### Financial

**Boeing Aircraft Corp.** disclosed a dividend of one-fourth share for each of 600,000 stock outstanding as a quarterly net percent of 30 cents, payable Aug. 24 to holders of record.

Aug. 1, President **Men A. O. Berch** reported sales in excess of \$50 million and net earnings of \$4.95 per share for the first nine months of the current fiscal year. The building of aircraft orders on June 30 totaled more than \$60 million.

### International

Three prototypes of a new lightweight British fighter will be built by Avions de Navale for the North Atlantic Treaty Organization. The 53.7-ton combat jet, the *Avion de Navale*, developed from the lightweight *Avion de Navale* II, will be financed jointly by the U. S. and Britain. First order probably will be followed by a contract for seven more experimental planes.

**Pittsburgh Twin Pacer**, small transport built by Scottish Aviation for local service in sublight operations, made its first flight. The company said its Pacer 1000 can take off at gross weight in 100 yards and land in 60 yards. Operating cost with a full load of 16 passengers on stage flights up to 760 miles was quoted at 3.8 cents per passenger mile. Powered by two 540-hp. Allen Hamilton 501 engines, the transport cruises at 174 mph at 7,250 ft., climbs at 660 fpm and has a stalling speed of 97.5 mph.





## Person to Person

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## Washington Roundup

### Fiscal 1957 Budget Plans

With the mid-summer drive for congressional approval of the \$13.4 billion fiscal 1956 defense budget top level White House Timmer and Pentagon planners are gaining consideration of the fiscal 1957 budget. Despite public opinion expressed hopes for disarmament on nuclear and hydrogen weapons as a result of the "summit" talks in Geneva, the Administration is not counting on it in its fiscal 1957 defense budget planning. Plans for a \$3 billion cut in the next year's defense bill have been abandoned in a study of the rapid growth of Russian armaments, particularly its jet bomber fleet capable of delivering hydrogen weapons. Preliminary planning for fiscal 1957 now centers on the issue of whether the defense budget can be safely held at the 1956 level or whether a \$2 to \$4 billion increase will be necessary to expand and accelerate growth of defense and address response to long ahead of the Russian challenge.

### British Transport Worries

Growing threat of American competition in the commercial jet transport market is beginning to worry the British aircraft industry whose members in the field were both shaken by the Soviet decision. British trade publications are beginning a propaganda barrage against the Douglas DC-8 and Lockheed Electra on the grounds that no suitable American jet engines are available for these planes and that they are small only for U.S. domestic airline operations and will not fit the European route patterns. Part is that both the Pratt & Whitney turbojet scheduled for the DC-8 and the Allison turbojet scheduled for the Electra will have far more open throat thrust than the British engines in the field are directed from use British engine as engine class. Current British visit of American Airlines President C. R. Smith and Robert Gross, president of Lockheed, is partly to "incite" General Motors Corp. management to support the Allison. However, commercial progress on the Model 801 turbojet engine.

### Subsidizing British Aircraft

Congressional opposition to subsidizing British aircraft manufacturing companies figured again this year in House debate on the \$2.4 billion appropriation for foreign aid. An amendment banning use of any part of \$705 million military assistance for aid to British manufacturers seemed adoption on a 31 to 91 vote. Rep. Alvin Bricker (R-Mich.), a sponsor of the amendment, reported that about \$100 million of the \$705 million is for subsidization of British aircraft manufacturers "to that they can come over here and establish contacts with some of our companies in the process for the use of commercial jet transportation instead of having American transports."

### Tax Amortization Study

Amendments to aircraft and airline companies payable will be examined in the "continuing study" of the accelerated tax amortization program of the House Government Operations Subcommittee headed by Rep. Robert M. La Follette (D-W. Va.). The subcommittee is launching the study with hearings on records in industry but has no defense phase beyond that. Members point out that the purpose of granting rapid tax amortization benefits

is expansion of the industrial base and that such amendments have need of the replacement facilities.

### Air Agreement Probe

Provided by the recent German bilateral agreement granting jet rights to Lufthansa at the western hemisphere, last page 158) Senate Commerce Committee is launching a full-scale investigation into the negotiations and signing of international air rights agreements by the State Department and the Civil Aeronautics Board. It will be made by a special subcommittee headed by Sen. George Murphy (D-Fla.) and including Sen. Alonzo Baker (D-Nev.) and Sen. John Bricker (R-Ohio).

On approval of the special subcommittee, Commerce Committee's chairman, Sen. Warren Magnuson (D-Wash.), commented:

"Our committee has no desire to interfere with the efforts of the State Department and the CAB, but when our members are so publicly criticized, I feel that it is time for our committee to find out what is behind the reasoning of the government officials who second them that sort of treatment."

### Jackson vs. Wilson

Defense Secretary Charles Wilson declined a second time to make written answers on a "closed door" basis to 13 specific questions on the relative positions of U.S. and Russian air power in the latest round with Sen. Robert Jackson (D-Wash.) over whether or not he should answer the questions (AW July 31, p. 47). A step-by-step account so far:

- In response to Jackson's request for answers, Wilson replied that they would be made available in executive session and added that "full subcommittee" has already been presented to the appropriate committees of Congress including several of which you are a member.

- Jackson replied that most of the information involved is already public, but requested Wilson to submit written replies for extensive consideration by the Military Appropriations Subcommittee on Atomic Energy, of which he is chairman.

- Wilson declined to submit answers as written form Jackson doesn't plan to drop the matter.

### USAF Counterpoint

As Force activation of the 19th Air Force at Foster AFB, Tex., is to be left expansion of AFMFB at the Army campus of USAF.

USAF and that Foster AFB was selected for the headquarters because of the major training role it may have with Army forces located in close proximity.

### CAB Candidates

Most likely candidates for appointment to the next vacancy on the Civil Aeronautics Board is Wagnell E. Lacey, 47, former Democratic congressman from Texas. Lacey is expected to be named as a replacement for two-term Sen. Lee whose membership expires at the end of the year. Lacey, a former Democratic senator from Oklahoma, has been considered one of the most prominent in the Board last February.

—Washington staff

## USAF Expands Basic Research Program

Close liaison with science, industry is mission of Office of Scientific Research, Fleckinger commands.

By Robert Hott

Baltimore, Md.—An Office is increasing its basic research effort aimed at increasing super scientific technology for development of airborne new aerial weapons.

That program had been proposed by Air Research and Development Command for some time, but was not recently approved at Defense Department level. The accelerated basic research program will be expanded and operated by an expanded Office of Scientific Research headed by Brig. Gen. Don Fleckinger, currently director of research for AIRDC.

The Office of Scientific Research will be elevated within AIRDC to where it reports directly to Lt. Gen. Thomas Power, AIRDC commander, and will shift its operations to Washington D.C., as soon as possible. The shift to Washington is aimed at providing close liaison with the National Academy of Sciences for Arms and Armaments, Office of Naval Research, National Science Foundation, the Air Staff and Defense Department staff scientific panels.

### Operative Plan

Office of Scientific Research will work double in \$7 million budget during Fiscal 1996 with further income planned for Fiscal 1997.

The new Office of Scientific Research will have two basic missions:

- Develop and expand a scientific portfolio in fields bearing on USAF priorities.

• Establish and maintain contact with the scientific community to keep USAF advised on all new discoveries in basic research so that they can be applied to an weapons development.

OSR will increase its research direct operations with industry, universities and individual scientists on an expanded basis with particular emphasis on the following areas:

- High temperatures.
- Hypersonics.
- Propulsion methods and fuels.
- Solid state physics.

It will expand its present Pasadena field office in liaison contact with the West Coast scientific industry and scientific community and also act as the backbone of AIRDC's branch office to tap the scientific resources of Western Europe.

Although OSR will operate under the command of Gen. Fleckinger, with Col. William O. Davis as deputy commander, close coordination with the scientific community will be secured by a central staff scientist and four civilian directors in each of the following fields:

- Aerodynamics.
- Materials.
- Life sciences.
- Physical sciences.

OSR plans three specific methods of establishing better communications between USAF, industry and university research groups and currently has a task force studying the problems of getting better liaison between USAF and industry at the research level.



Brig. Gen. Don Fleckinger, Jr., is one of USAF's experts on aerodynamic and a pioneer in developing human factors research to improve efficiency of combat crew. Graduate of Stanford University Medical School, Fleckinger took post graduate medical work at Harvard and Vanderbilt Universities before joining the Air Force in 1957 as a flight surgeon. His contributions in human factors field began with B-17 crews in WWII and continued through the B-36 and B-52 programs. He was awarded the Legion of Merit, Soldier Medal, Bronze Star and Air Medal for his immediate air combat operations on the South China Seas during World War II. Fleckinger, who made many parachute jumps landing medical teams to assist bomber and transport crews that crashed in the Pacific wilderness. He has been with Air Research and Development Command since 1991 as its first director of human factors, and has been director of research for AIRDC since 1994.

### Symposium Plan

OSR plans to sponsor symposiums on critical subjects such as hypersonics, combustion instability and other areas in which USAF is encountering technical stumbling blocks.

These symposiums will feature panel discussions with air formal papers. They will be attended by a mixture of military, academic and industry scientists and wherever possible will be aimed at "cross pollinating" between basic fields such as the mixing of atmospheric gases and plasmas on the problems of hypersonic flows.

continue a rapid pace of weapons development during the next five to 15 years. Without a great expanded and advanced base of fundamental scientific knowledge as a foundation for weapons development, top USAF leaders feel they will not be able to maintain technological superiority over potential enemy superpowers.

## \$15 Billion Available For Military Plans

Air Force and Navy now have up approximately \$15 billion available for new aircraft and related procurement contracts. Here is the fund breakdown:

- Fiscal 1996 budget provided \$7.2 billion in new money, \$6.3 billion for USAF and \$900 million for Navy.
- Unobligated balance on hand, as of June 1, totaled \$7.8 billion. That included USAF, \$3.3 billion, Navy, \$2.4 billion.

New money and the unobligated funds for aircraft procurement totals \$14.9 billion.

During May, obligations totaled \$34.6 billion USAF, \$34.6 billion, Navy, \$4 billion. At this rate, it would take 13 months, or more than three and a half years, for the services to obligate the \$14.9 billion.

Obligations for eleven months of Fiscal 1995 totaled about \$4.2 billion USAF, \$4.1 billion, Navy, \$729 million.

Expenditures for the 11 months just ended totaled \$7.9 billion, compared with \$6.3 billion for the same Fiscal 1994 period. On June 1, the two services had unobligated balance for aircraft and related procurement of \$18 billion USAF, \$12.5 billion, Navy \$5.5 billion.

## USAF Shows Airlift Capability In Moving Regiment To Japan

By Claude Watan

Tokyo—First half of Operation Gyronope, largest and longest air troop movement in history, was completed 1 hour ahead of schedule.

The air lift switch between Ft. Campbell, Ky., and Japan involved carrying about 1,900 soldiers to Japan, the 43 Douglas C-124 Globemasters engaged in the operation immediately started loading 1,130 other personnel in Japan for the long return flight to Kentucky.

This exchange of personnel—the 390th Regional Combat Team is playing the 18th Airborne Division—has been the first of a series of large-scale air movements to demonstrate three significant developments:

- Ability of the Army to cover potential danger spots anywhere in the world with the Global and Global Pacific.
- Ability of the U.S. Air Force to schedule and execute the operation in the record time of 15-200 miles, the 18th AF will fly more than 650 miles per hour.

Details on scheduling and keeping the troops moving rapid loss of vehicles and mechanical trouble required cooperation from all USAF elements along the line of flight.

- Recognition that this type of fast and efficient troop movement, adequately demonstrated, will serve as a deterrent

to potential aggressors. Col. Norman E. Telford, commander of the 18th Airborne, told Aviation Week he is confident that the story of the Korean war would have to be rewritten if this 11 day airlift had not taken place.

### Meisterkammer Arrangements

For Operation Gyronope, the big C-124's were stopped at about weight at their base. Col. Charles M. R. S. C. Nine cargo have been removed and other equipment taken out to the weight of each plane by more than two tons. Installed for the trip are five 20 cubic ft. tanks, two 10 cubic ft., 100 Mile West life preservers, three double-equipped life rafts and four USC-4 rafts, plus emergency air and drinking water.

Load for each aircraft at 90 passengers, each with his weapon and personal gear, and seven tons of baggage. Anticrew gear weight for takeoff is 115,000 lb. About 21,000 of this is personal and equipment and 55,000 is 40,000 lb. fuel.

Advance preparation included positioning of 500 mechanics and support personnel along the line of flight. Three stations include Ft. Campbell, Ky.; Travis AFB, Calif.; Hickham AFB, Hawaii; Wake Island and two stations in Japan—Adachi and Narita—from where the 18th ACGT takes off for its home base.

Then set down to Melski Army



Crosswind landing gear is standard production equipment on the Boeing B-52J Superfortress. Boeing Airplane Co. has announced, continuing Aviation Week's report May 16, p. 9. The photo shows the B-52J being with the landing gear at Boeing Field, Seattle, Wash., against a crosswind. All four dual-wheel tires revolve. The B-52J landing gear was developed by Boeing and is produced by Cleveland Pneumatic Tool Co. and Boeing Airplane Co. Boeing says that the installation is the first use of crosswind landing gear on a production jet plane, as our production military planes and on our landers. The company initially tested the gear on a B-47 Stratojet in 1952 at Wichita, Kansas, DeWitt.

## Crosswind Gear Standard on B-52







# State Signs German Bilateral Despite U. S. Carrier Objections

Washington, D. C.—The bilateral or transport agreement between the United States and West Germany has been signed under the protest of Congress and several U. S. airlines.

After re-examination of the disputed document the State Department and Civil Aeronautics Board announced that "in consideration of all aspects of the national interest," the agreement should be signed without delay.

The agreement between the two countries follows the principles established in the Bonnside agreement between the United States and the United Kingdom in 1946. The main areas in the agreement given Germany are the following routes:

- West Germany to Boston, New York and Philadelphia
- Beyond these points to the Caribbean Sea and to South America.
- West Germany to Chicago.
- West Germany to either Los Angeles or San Francisco.

One of the West Coast points will be chosen in the German letter as a final rule for future service.

In return American airlines—Trans World Airlines and Pan American World Airways—get routes from the United States to:

- Hamburg, and beyond to points in Europe north and east of West Germany.
- Düsseldorf-Cologne/Bonn, Frankfurt, Stuttgart and Munich, and beyond to points in Europe east and southeast of West Germany.



First prototype of Dornier Do 14 night fighter was used by Mine. Aired to air war museum's spot around of 7th night (WW II) July 13, 1977. These are development of Mine 4 everything in flight changes include two-piece cockpit, new wings with underwing fold and include. Airman's probably a pair of Dornier 14s were involved. Pilot and engine units are obsolete.

## Commercial Jet Test

First A. White Aircraft reports to begin commercial service with its JTH-1 certified version of the JTH-1 turboprop at a major overhaul interval of 500 hr. The JTH-1, today will be the powerplant for both the Boeing Model 717 and the Douglas DC-8. It is also reported for the Conair overwing transport design now being awarded by purchase in Howard Hughes to Trans World Air Lines.

The JTH-1 has been given a 1,000 hour test run simulating actual airline operation on a New York-Los Angeles route with a stop at Chicago. Less than 50 test hours of maintenance were required during this operation which was run in two 500-hour increments.

A plugged bearing oil line was the sole service problem encountered during the operation. That occurred after 975 hours of maintenance operations.

The JTH-1's engine version of the split compressor design has been actually flown for 100 continuous hours without even half an accelerated service test of the engine's aircraft in general.

was constant to testimony of airline representatives.

## Senator's Attack

A strong case was expressed by Senator George A. Sullivan (D-Fla.) who called the agreement "a thoughtless and completely unperfected giveaway on the part of the State Department." Sullivan pointed out that the United States has spent billions of dollars in rehabilitation of Germany, and he felt it is unnecessary to grant the Germans rights between Germany and New York, then give them "and beyond" rights to Latin America without limitation.

Senator Sullivan said that cooperation of the German airline with East or Airlines National Airlines Pan American World Airways, Trans World Airlines and others "will cause the American public will have to make up the loss to our own domestic airlines through rebates by the conventional route."

According to Sullivan (now Latin American countries have been denied entry to New York. "This agreement," he said "is being signed contrary to the expressed opinion of the majority of the members of the Senate Interstate and Foreign Commerce Committee and will result only in great indignities and confusion for our Latin American neighbors and other countries with whom we have not been so generous, and a financial loss to our American airlines—unlike the American majority."



## The Never Ending Watch

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**CONAIR**

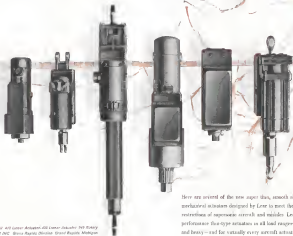
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Lear electro-mechanical actuators illustrated (left to right): 300 Power Unit, 400 Linear Actuator, 400 Linear Actuator, 700 Torque Actuator, 300 Power Unit, 400 Linear Actuator. For information circle 12 on Reader Service. Bristol Rapids Division, Bristol Rapids, Michigan.

Here are several of the new super slim, smooth silhouette electro-mechanical actuators designed by Lear to meet the severe envelope restrictions of aerospace controls and missiles. Lear provides high performance flex-type actuators in all load ranges—light, medium, and heavy—and for virtually every aircraft actuating requirement.

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## Rothschild Favors Free Hand For CAB in Subsidy Allocation

Washington, D. C.—Congress' Department says legislation giving Civil Aeronautics Board a free hand to decide which airlines—and contractors or otherwise—should receive subsidy and which carriers should no longer be eligible for subsidy.

On these two points Commerce is in agreement with CAB (AW June 6, p. 12).

The department's view was expressed in a report by the Under Secretary for Transportation, Louis Rothschild to Sen. Warren Magnuson, chairman of the Senate Commerce Committee.

But, in advocating long term subsidy contracts—so that carriers could calculate their revenues and the government would know the full Commerce is at odds with the Board. CAB Chairman Roy Bailey argued in favor of continuation of the open market procedure to determine subsidy, as well as mail pay rates.

"We believe there would be merit to subsidy contracts, since they would permit more orderly future planning for both the carriers and the government," Rothschild declared in his report.

### Receipts Presumes

He made these proposals for the contracts:

- One half of a carrier's earnings in excess of a reasonable profit should be subject to inspection at the end of the contract period. Bailey said that 1970 should be recognized, meaning "while a substantial carrier is entitled to a fair return on its investment, it is not entitled to excess profit."
- Rothschild emphasized that CAB should state at the beginning of the contract period specifically what would be considered a reasonable profit "so that the carrier would know from the start... what portion of his earnings may be subject to inspection."
- Contracts should not exceed five years in duration.
- CAB should be permitted to make maximum use of the informal conference procedure, where agreement on contract terms can be reached with the carrier without a hearing. There should be "opportunity" for a hearing, but such a hearing should not be a legal requirement.
- Some "emergency" clause may be necessary to permit stopping of the contract only in the event of drastic changes in circumstances beyond the control of the carrier. "However, it should be made clear that such author-

ity should be used sparingly, as also the significance of the contract arrangement would be lost," Rothschild also added.

### 'Subsidy Eligibility'

Congress should enact a policy, declaration that "subsidy, should, to the maximum extent possible, be limited to transporters of passengers and mail" and CAB should be given clear authority to remove the basic eligibility for such subsidy.

Under Rothschild's plan all carriers or carriers would be required to obtain certificates of maintenance and safety. Such certificates would state specifically if it authorized "eligibility for subsidy."

Certification for the carriage of mail would no longer automatically authorize an airline for such subsidy eligibility.

As for the extent all carriers with mail certificates would be granted "eligibility for subsidy."

Rothschild added that CAB should be directed to "continuously review the operating results and financial position of carriers eligible to receive subsidy, with a view to eliminating such eligibility."

## KC-135 Autopilot

Being KC-135 carburetor, flight equipment will be supplied by Lear, Inc.

Initial contract covers prototype



### Crowded Corner at Boeing-Seattle

Three large Boeing aircraft undergoing tests at the company's flight test center at Seattle are shown in the view at a corner of the facility. In the foreground is one of the two YC-119 transport aircraft and in the background is the F4U-134 transport engine on the middle is the prototype T-10 jet transport, which has been flying for almost a year. In the air is one of the B-72 Stratofortress now in various phases of an exhaust test program. Numbered aircraft show that 600 employees at the flight test center

airports and test production units with deliveries scheduled through 1975, from the Grand Rapids, Mich., Division.

Units will be modified 3-80 systems developed for aerospace planes (AW Jan 15, p. 5). Last experts claim an estimate for the KC-135 equipment to test several million dollars and new contract signs prospects of commercial orders when test version of the design flying transport is ordered.

## CAA Will Evaluate 'High-Density' Rules

A high density air traffic rule has been established by the Civil Aeronautics Administration at Washington, D. C. in part of an experimental program aimed at improving air traffic control.

High density route rules will apply to all aircraft operating in the area between August 1 and November 24, 1955. Aircraft operating in the area must:

- Be equipped with a two-way radio.
  - Establish and maintain communications with the appropriate control tower before entering or leaving the specified area.
  - Observe a speed limit of 150 knots 100 knots.
- Operations under visual flight rules are prohibited unless ground visibility is at least one mile.

During the experimental period, operations will be monitored and evaluated by the Federal Aviation Administration's Civil Aviation Committee headed by J. N. Rogers, Chief Special Operations.

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### SPECIFICATIONS

**Size**—Diameter 3 inches  
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**Rate rate on accuracy**  
(including earth's rate)  
14 1/2° per hour maximum  
**Oil**—100 times viscosity  
**Pressure Indicator**—Kilobars  
—0 to 100  
**Deflection**—360°—400 (up to 175 with  
Vibration: 500 (up to 175) at 100 cps  
—1000 (up to 175)  
**Temperature Range**—-14° to 170° F  
Gyroscopes have engineering  
specialists are available for  
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Designs and production of precision gyroscopes,  
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Bureau, CAA Office of Aviation Safety.  
The Washington high density area  
not first proposed by an AOC group in  
February 1974. Late November, the  
CAA dropped the industry to consid-  
er the area in the CAA, but opposi-  
tion from small plane users, accompanied  
by the Aircraft Owners and Pilot's Asso-  
ciation, held the project up. Public  
hearing were held, and the CAA has  
decided to go ahead with the plan.

To meet needs of light plane opera-  
tors, the CAA has occupied various  
landed areas south of Washington's  
National Airport from the high density  
area regulations.

## Sailplane Designed for Upper Air

Los Angeles—A sailplane with a wingspan larger than a DC-7 has been de-  
signed for use in scientific research at  
altitudes above 70,000 ft.

The plane, designed by Victor M.  
Sander, would have a wingspan of  
120 ft, three feet more than the big  
Douglas transport. The engines could  
cover 2,000 miles, Sander says, by  
riding jet streams. Cost of the  
experimental glider craft will be per-  
manently.

Launching and capturing the area in  
which it tends to be as turbulent than  
it may be during its transport phase  
is cited as one of the more values it  
could have.

Sailplane design calls for a rubber  
hatch of more than 17 ft and a gross  
weight of 2,500 lb. It could descend  
at 500 mph.

An engine-powered plane would  
take the sailplane to an altitude of

## New Marine 'Teats' To Cut Airlift Cost

An transportable ground power unit,  
designed by the American Power, will in  
place all tests used by Marine Corps  
aviation units. Equipment comes in  
dimensions of 36 ft, 41 ft, 35 ft and  
117 ft and features lightweight metal  
construction covered with Neoprene-  
coated synthetic fabric. Movement  
assisted by a single Marine aircraft  
was equipped with the design will save  
\$15 million compared with present  
equipment, Defense Dept. states.

12,000 ft for the first model in an  
area of equally available winds.

Referring to the 90,000 ft modified  
world altitude record set by the Bell  
X-1A in 1954, Sander says, "I'm not  
sure that a sailplane couldn't be built  
to go that high. The scientific value  
of having a sailplane of that compa-  
rison is enormous. In my mind I've  
struggled to cover a load of 600 lb of  
instruments."

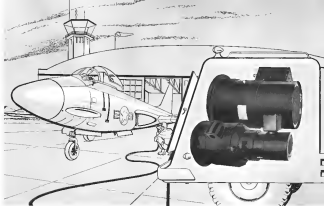
"We could replace some area at  
least where they enter the atmosphere.  
It would be easy to replace where man  
could start, investigate electrical prop-  
erties high up, collect spores and in-  
variant seeds of new atomic bomb  
bomb."

Scientific instruments work much  
better in a sailplane than in a motor-  
ized plane, Sander points out because there  
are no noise, vibration or magnetic dis-  
turbances.



Indonesian Stinger

This sleek, little sailplane plane is a ground support aircraft designed in Indonesia by  
Vito Pringgono, director of the IAF experimental section. Named "Stinger"  
(Sting), the plane is of conventional construction, with a mid-wing fuselage covered with  
duralumin, aluminum wing and tail, and fixed landing gear. Prevailing it is a  
de Havilland Gyrocraft at 200 hp, under the 300 mph of an engine. Range is  
500 mi. Gross weight is 3,400 lb, wingspan 34.8 ft, length 25.7 ft. Duralumin is used in  
two blades, dual pitch and. First flight was in August 1974.



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and mounting limitations and electrical requirements.  
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product performance.

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generator is engineered to require a minimum amount  
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ductive power with longer, more dependable life.

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plication engineers are ready to assist you. For more  
information contact your nearest G-E Representative  
Sales Office, General Electric Company, Schenectady,  
New York.

**GENERAL ELECTRIC**



A. W. Parkes, Jr., Vice President, Aircraft Radio Corporation says—

## "New G-E aircraft motor designed for us stands terrific shock, extreme temperatures"

"We recently went to General Electric for a top-grade aircraft motor for remote tuning of an aircraft radio receiver we were designing," Mr. Parkes goes on to say. "G-E came up with a motor that operates dependably and smoothly at temperatures ranging from -86C to +16C. At the same time, of course, the motor stands up under humidity, vibration, and the shock accompanying aircraft operation under both normal and combat conditions."

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Corporation engineers went to the G-E plant to take advantage of extensive environmental testing equipment there. We're sold on the value of such application help."

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### NEW G-E AIRCRAFT MOTOR MEETS THE AIRCRAFT RADIO CORP. NEEDS

- 1 to 100 output at 120 rpm, 58 watts input
- Maximum break life: 120 hr at 11,000 ft, 90 hr at sea level
- Better start, stop motor varies 45 degree rotation of output gear
- Weight, not over 8-94 lb.
- Corrosion duty cycle

## WHAT'S NEW

### Publications Received

- **Handbook of Reliability** S. A. Slaughter-Pub by the McGraw-Hill Book Co., 1221 Ave. of the Americas, New York 20, N. Y. 10020, 120 pp. Basic survey of principles underlying value of probability interest to service personnel and students of probability and statistics.
- **Basic Laboratory Procedures** John F. Stevens-Pub by the Reinhold Publishing Corp., 410 Park Ave., New York 22, N. Y. 10017, 288 pp. Contains practical information for laboratory engineers, maintenance engineers, plant or shop foremen, purchasing agents and students.
- **ASTM Standards on Petroleum Products and Lubricants** Requested by ASTM Committee D3 on Petroleum Products and Lubricants-Pub by the American Society for Testing Materials, 1913 Race St., Philadelphia 3, Pa. \$6.65 for cloth copy, \$2.00 for paper cover. 190 pp. Compilation of specifications, methods and definitions covering petroleum products and lubricants.
- **Diagnosis in the Neuro-Robot** J. Slaughter, M.D. Colonial Medical Corps, USAF-Pub by Charles C. Thomas, 301 E. Lake Street, Springfield, Ill. \$6.75. 576 pp. History and advances of the Neuro-Robot Area.

### Telling the Market

**Fiber Lacquer With Dye Fastness**, 21 main dyes, mixed and other colors. Ferro Products, Inc. 6115 S. Central Ave., Los Angeles 3, Calif. All Kaidagite materials available for preparation and reproduction of drawings and documents, colorless short, Graphite, its protective Division, Eastman Kodak Co., Rochester 4, N. Y.

**8640 heavy-duty barrel punch press**, 1200 lb. Westinghouse Machine Co. Dept. 124, P. O. Box 6794, 4172 W. 9th Avenue, Philadelphia 12, Pa.

**Dumping Device-Pat. Patent and Patent Pending**, design, operation, Control Co., Dept. 10, 1145 Euclid Ave., Cleveland 15, Ohio.

**Steel data on standard alloy steels—new sheet, well short**, Robert Allmann & Chemical Sales, Inc., Industrial Sales, via Division, 1924 Broadway, Oakland 12, Calif.

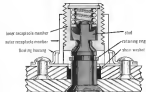
**Radio frequency conversion**, Catalog D5, American Pacific Corp., 1630 S. 9th Ave., Georgia 30. 12

**Model 2128 power tube burner**, Catalog 1144W2, W. D. Winters, Tube & Heat Division, Fuller Appliance Co., 17325 Euclid Ave., Cleveland 12, Ohio. — **Signet and rechangeable page block**, annotations, brochures, 110000 Standard Division, Dearborn Corp. Co., 2308 Beach St., Dearborn, Mich.

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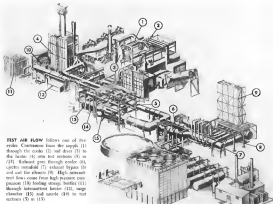
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**TEST AIR FLOW** follows one of three routes. Compressor from the supply (1) through the cooler (12) and then (13) to the burner (4) and test sections (5) or (14). Exhaust gas through cooler (6), ejector (10) and (7) exhaust bypass (8) and vent to the atmosphere (9). High-intensity test flow comes from high-pressure compressor (16) through storage bottles (11) through intermediate burner (12), surge chamber (13) and nozzle (18) to test sections (5) or (15).

## Wright's New Lab Tests Giant Ramjets

By David A. Anderson

Woodbridge, N. J.—Supersonic ramjet engines big enough to propel intercontinental missiles can be tested in the new Wright Aeronautical Division laboratory here.

The new facility is no mere extension of the original building; the original test cell completed six years ago and still housed "among the finest in the world" by Curtiss-Wright engineers and product Roy T. Hixley.

Among the accomplishments of the original cell was the development testing of a ramjet engine that "completed the world's first successful controlled flight May 7, 1951, at a high Mach number." This engine previously was flown in the Lockheed X-7 test vehicle, a delta-winged surface developed first as a compressed ramjet, but later

shifted to the side of flying boosted for Wright and Marquand supersonic jets.

The first test cell could handle a 50-in. diameter ramjet, big enough to power the long-range North American P-56B missile, one of the new cell will be considerably larger, and will cover the altitude range from sea level to a simulated height near 50,000 ft.

### Two Jobs

The new facility—in reality a gigantic addition to the original laboratory—will have two major tasks.

• **Combustion chamber development**, aimed at increasing the inflow speed at which efficient combustion can be maintained. Increased speeds at the combustion chamber inlet cause a shorter overall ramjet.

• **Supersonic diffuser development**, for

increased efficiency of aerodynamic compression. At Mach numbers above 2, simple ducts have very low efficiencies and more sophisticated geometry must be used to obtain higher diffuser efficiencies.

These ramjet cycle and operational problems were detailed last week in *Aerospace Week*, p. 35.

Tests can be made of engines either as a hot jet, simulating engine operation as they are in a connected pipe, generally the technique used to develop combustion chambers only. Stride flow tests can be made up to one hour in duration, limited in time by the re-charge rate of the gas-tight system used to draw the current for altitude simulation, and the exchange rate of the air system.

For short time tests, a blowdown air storage system can provide pressure and



**TEST SECTION** of new ramjet facility is 36 ft long, 14 ft dia.



**TWO STANDS** (new at right) compare ramjet blowaway.



**FREE JET** used for ramjet test can be wheeled into place.



**HEATER AND BOTTLES** are upstream portion of intermediate flow supply.

flow up to 700 lb per second for about one minute.

One of the new jobs is comparable to high altitude test cells at NACA's Lewis Flight Propulsion Laboratory at Cleveland, and the Air Force's Arnold Engineering Development Center, at Tullahoma, Tenn. The company says the installation is the largest privately operated supersonic high-altitude laboratory for the development and production testing of ramjet engines, which—even with all the qualifying phrases—is impressive.

First tests were made last fall in the new test cell, since then, development testing time has been increasing steadily. The addition cost \$3.7 million—of which more than \$1.5 million, the total value of assets facilities at Wright.

Construction of the unit began in 1951 to the design of Curtiss-Wright

engineers, following principles they developed nearly 10 years ago.

### Impressions

To a casual visitor, the Wright test facility is impressive because of its sheer size. Ramjet test engines and engines lower costed, and a second low gallon water tank, sets 70 ft across the air. Masses of instrumentation and control leads complicate the picture. But to an engineer who has had to make-do with temporary facilities and notions of a low pressure jet engine, the Wright setup looks like Paradise.

In the new climate, the test stand is a tank, 34 ft, in diameter and just short of 160 ft long. A 16-ft-long hatch swings up to lift the test area for modification of engines or combustion-chamber engines.

The first test cell, installed more

as years ago, is 32 ft in diameter and 85 ft long. It will take ramjet engines up to 16-in. diameter.

Noise and heat within the test cell are partially subdued by a 3-in.-thick layer of water flowing between the walls of the tank.

But exhaust from the engine on test is cooled by water spray before it enters the exhaust gas column. Thrust ratings of test engines currently are established by a first balance computed from data taken during the exhaust-cooling cycle, but electronic systems will be used later.

Air supply for compression comes from a pair of old T35 turbo-jet compressors, back to back, driven by electric motors. For interstitial oxidation, superheated compressors charge air bottles at 1,100 psi. In blowdown use, about 700 ft of air per

## ADDED SAFETY for the Skyways



RCA

RCA's new C-Band air-borne weather mapping radar unit makes a big step toward all-weather commercial air transport service—a major contribution to added efficiency, safety and comfort in flight.

Efficient and reliable, too, are the Camloc carrier-burn heaters that hold the C-Band's electronic assemblies firmly in place. A carrier-burn and the Carrier heater is opened just. A carrier-burn and the Carrier heater is closed first-to hold fast!



Electronic components of this RCA C-Band radar assembly unit are assembled in groups for quick and easy servicing. Camloc carrier-burn heaters provide the fast-acting, shock-loading removal of ensuring quick accessibility in the ground. Various proof operation in the air.

Carrier-burn heaters and heater unit, ensuring the assembly and mounting of units. There's a Camloc carrier-burn heater in every proof operation in the air.

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WEST COAST BRIDGE: 3410 WILSHIRE BLVD. 1023 AMPLER, CAL.

second block through the Gustav Wright test cell.

Capitals of the test cell are heated to near or temperatures to values simulating flight at supersonic speed.

Heated air passes to the test section through a representative, variable Mach number nozzle with a speed range from Mach 1.5 to near 5.

Most of the instrumentation in the control room is automatic, tied to both pressure and position systems and position. Software and position systems are used to observe the tests.

## THRUST & DRAG

In a world bedeviled by a multitude of measurement systems that weigh things in pounds, grams and kilograms, it appears we need another system to be called "comparative units."

There are to be sure much to the people who make things containing some obscure, highly technical unit such as horsepower or wattage. If it were a story about a new engine, its power is incredibly compared to a number of other horsepower. If it is a rocket engine, its thrust horsepower is compared to the enormous power of big ocean waves; the freight operations in air transport, it can hold, would weight all the coffee in Brazil across the South Atlantic.

There's one trouble! horsepower I know about as a concept. But does horsepower-mean power do they have? From 400 to 5,000, are a measuring hand. Or are they? Are we talking the Camloc or the Quercus? And last how much coffee is there in Brazil? In short, or is the issue?

For the trouble! We need a common unit. Then when the stars say that the power is equivalent to 75 horsepower units, we all know what the job is talking about. Better still, what's wrong with just plain horsepower?

The most scientific rule in the air today is an any reasonable Douglas DC-3. You double up to get in the door, make the uphill task to a single unit on the right side of the aisle and serve down. The engine are surprisingly quiet and takeoff is short.

Over 1000 the heavy-duty had weather through the no less than a modern altitude. If it's clear you can see the ground, it's a rough, the higher lower score under and the sliding gear.

The standards are new and eager, the new ways to plan right. You have Repsons and answers.

Learning is getting the correct, the first and the vanishing shock at the



*Judge  
a Product  
by  
its Users*

In developing its versatile reconnection bomber, the RD-66, Douglas utilized a wide range of Aeroquip products and engineering services. The planning systems include Aeroquip weight-saving hose lines and, of particular note, rigid tubing assemblies made to precise specifications by Aeroquip.

**Aeroquip**



Aeroquip Corporation, Jackson, Michigan • Aero-Coupling Corporation, Buellark, California (A subsidiary of Aeroquip Corporation)  
Local Representatives in Principal Cities in U.S. and Abroad. Aeroquip Products are sold exclusively by Dealers in U.S. and Abroad.



# Reliability



## GOVERNMENT PRODUCTS DIVISION

Just as success sailed with John Ford on the thundering, blood-soaked decks of *The Reiver* and *The Sun Shines Richard*, so in every major conflict to this day has victory crowned the valor of our fighting men. Reliability in men and machines was, and is, the security of our nation. At Rheem, we, too, are proud of the reliability of our men and machines and the enviable record of low per unit cost and airborne completion schedules assumed in our role as prime contractor to the United States Government and subcontractor to other industry leaders. The Government Products Division of Rheem are presently in quality development and production on air frames, missile and propellant components, airborne ordnance, electronics and ordnance material.



YOU CAN RELY ON RHEEM

Rheem Manufacturing Company • GOVERNMENT PRODUCTS DIVISION

BORNEO CALIF • SAN PABLO CALIF • WASHINGTON D.C. • PHILADELPHIA PA • FULLINGTON N.J.

which took it of a different era. That era was when air transport was getting its biggest push from the fast, two-engine DC-8, and when an impending year was to build the airplanes of the sky. Since then speeds have doubled, altitudes tripled, payloads loads quadrupled. Transporting people is a massive industry that seems to have no bounds.

Today, the DC-8's daughters and granddaughters slice the cold upper air and make intercontinent travel a delight instead of a one-day trial. But I do hope that some airline flying a seven-mile somewhere can afford to serve short-range jets as DC-10s get as big as the old jays will hold together. That's our customer.

\*\*\*

Once there was a Scientist, working in Advanced Research. His work was far beyond the understanding of most of his Fellow-Scientists, moreover, it was extraordinary Work. It was so good, in fact, that the Scientist feared about the possibility that it might fall into the Wrong Hands. His Superior was worried, and so were they. He said: "What are we doing?" they asked. The Scientist: "We must keep the information from getting to a possible Enemy."

In one Corner of the Laboratory was a large Safe. Behind it, the Scientist's Superior and Advisors knew the solution.

"We will lock the Data in the Safe."

they said, "And that will keep it from any Enemy. Furthermore, we will not tell anybody the Combination. That will be a Secret only we can share."

So they placed the Data in the Safe and locked it. And their judgment was confirmed, because no Enemy ever got his hands on it.

But another day Friendly Scientists—and these were Some—who needed the Data had to go work. They were doing Their complicated share Project, but it was a second rate job.

Many months later, after the Radio-remains had dropped to a safe level, some Enemy Scientists were pushing through the wreckage of the Laboratory. In a corner they found a battered Safe, its paint worn and its Lock forced.

"Look at this," said one Scientist, drawing a thick Report from the Safe. He and the other read it carefully. Then they looked at each other. "We were very lucky, Constant, very lucky," and the first One: "This plan for a Defense was indeed superlative."

—EWA

### SAC Jet Bomber Mark

Strike-Air Command jet bombers passed the 1 million-hour flight mark recently, eight years after they were assigned to the command. USAF predicts that the fleet will log another million hours in about 15 months. SAC jet fighters and bombers are currently aloft some 50,000 hr monthly. Figures do not include the ground period. It is

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### Visible Vortex

Vortex screen method, developed by NACA engineers for flow visualization, permits quick after study of vortices generated downstream of a model. By viewing a fog in the air stream and illuminating a cross-section of the stream with light through a screen disk, it is possible to see the vortices as dark trails in a light plane. This view, a lighting system on a wind tunnel, the sting mount for this model is at the bottom.

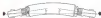
AVIATION WEEK, July 18, 1953

# ANNOUNCING

the new **BALANCED-DESIGN SERIES** of  
**FAFNIR ROD END CONTROL BEARINGS**

## A Complete Family of 5 sizes

Designed specifically with bearing capacity, shock strength, and bolt strength all in balance, the new Fafnir series of rod ends is the direct result of an NASC study in which Fafnir engineers participated. Every member of this new and family is completely new, carefully engineered and tested. Together, they represent the latest series of rod ends developed with a significant relationship between bearing capacity, shock and bolt strength. What's more, Fafnir Balanced Design Rod Ends are made to withstand column action under compressive stress with angularity as high as 9°.



Even the shank threads of the new rod ends are precision rolled with angled roots to insure maximum strength and fatigue life.

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**FAFNIR**  
AIRCRAFT BEARINGS

*FIRST... at the turning points  
in aircraft design*



## Bristol and RAE Test Britannias

Extreme light and water test program for the Bristol Britannia, long range transport, is nearing the final stages of production of the aircraft.

Third production Queen's aircraft Britannias passed the flight test phase June 29 on its first flight. A complete infinite life long pressure tested under water in a technique developed for the DH Comet.

Eight more deliveries are now on schedule at Bristol's Filton factory, and another production is being up at Short.



**FOUR FOR FLIGHT.** Prototype Britannia and first three production models are now at flight test program with more than 3,500 lb. accommodated.

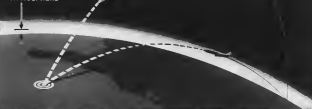


**ONE FOR WATER.** Pressurized tank of RAE Farnborough surrounds Britannia aircraft, to be tested in destructive water tests.



**WING DEFLECTION** of Britannias under water test is result of simulated flight loads fed into structure by hydrostatic jacks.

TRUE DEPTH OF  
ATMOSPHERE



AERODYNAMIC HEATING will be severe for hypersonic ballistic and glide-type missiles. Temperatures are suggested for clarity.

## Cooling for Hypersonic Missiles Sought

By Irving Stone

**Midwest Field, Calif.**—The ferocious heat levels of aerodynamic heating through which today's low supersonic performance and projected speeds of 10,000 to 15,000 rpm for some of the most advanced ballistic missiles.

No relatively few solid state elements are going to withstand the heat generated by very high supersonic flight—some cooling means will have to be devised to give sufficient resistance. This problem will exist for hypersonic aircraft as well as missiles, flying within the earth's atmosphere.

And because cooling isn't likely to be able to do the entire job of keeping surface heat levels to an acceptable value, engineers will have to be designed to absorb heat directly as that external structure will be reversible light, variable to withstand high thermal stress.

These are some of the facts of hypersonic flight now being studied intensively by researchers at the Ames Aeronautical Laboratory of the National Advisory Committee for Aeronautics.

With missiles now flying at the

firefield of this transonic and supersonic heat area, Ames researchers are looking out windows to fill in the wide gap of unknown between present speeds and hypersonic values proposed for the relatively near future. Highlights of this work were revealed at NACA's 1955 Thermal Symposium at Ames Research of the laboratory disclosed.

• **Flow heat is generated on aerodynamic surfaces.**

• **Possible solutions for heat dissipation** by convection of fluid through porous skin or by circulating the coolant by such methods.

• **An electrical analogy** for predicting with high accuracy how surface absorbs heat through three external state heat.

### Blunt for Cooling

While pointed noses and wings with sharp leading edges will reduce drag at hypersonic speeds, they are undesirable from the viewpoint of heat transfer.

There is very little evidence at the tip to absorb the heat passing into them from the hot boundary layer and

therefore, they heat up very rapidly.

Films of experimental tests of the laboratory demonstrated these heat effects on a composite model as a low-speed stream of gas whose temperature corresponded to flight conditions at about Mach 6. A sharp-nosed body began to glow, while one with a slightly blunted tip glowed less brightly. When a large area of the nose of the sharp-nosed body became incandescent, the blunt body was noticeably cooler.

Similarly, a model of a plate with one wing panel having a sharp leading edge and the other panel with a blunt leading edge showed the blunt edge glowing while the blunt wing panel remained relatively cool.

Tied to actual hypersonic flight, this means that extreme surface temperatures brought on by aerodynamic heating could result in destruction of a missile as soon as it passed through the atmosphere, because of the intense heating and associated loss of material at the surface of the structure.

### Sweating It Out

One of the most promising techniques now under consideration for



TRIDY REACTIVITY for highly partial application of electrical analogy at Ames.

## by NACA

allowing heat transfer to high-speed stream in transpiration cooling, also known as sweat cooling.

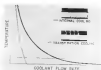
In this approach, a gas or liquid is passed through a porous metal skin to produce a blanketing effect retarding the transfer of heat from the skin to the gas. It is likely that water would be used in the cooling medium because of its high heat capacity and high latent heat of vaporization. However, depending on weight factors and other operational considerations, some other liquid or gas might be used.

Another approach might be the use of a cooling liquid circulated directly beneath the skin and discharged overboard.

While transpiration cooling is more advantageous in that it would require a lower coolant flow rate than the internal cooling method—perhaps only a third as much as now—over the latter has not yet been ruled out. The field is so new that no hard and fast solution can be projected at the present time.

One instance where internal cooling of skin might be the practical answer

**ELECTRICAL ANALOG** reveals temperature conditions on double wedge wing as it flies after 2 sec. of the acceleration period. Transition flow becomes turbulent flow just forward of wedge peak (at center) causes temperature rise which retards Ames testing rig.



COMPARISON of transpiration and internal cooling flow rates. At reference temperature (dotted line) flow rate for transpiration method is about one-third that for internal cooling. Ames is studying both methods for evaluating aerodynamic heating.

### HEAT-RESISTANT

selection of high-efficiency are expected to be used from Ames research using electrical analogy to solve aerodynamic heating problems. Method is accurate, simple to use, and flexible.

### THERMAL CIRCUIT



### ELECTRICAL CIRCUIT





## Aircraft Controls

... selected to maintain  
correct cabin temperature on  
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Recent additions to the 22 Barber-Colman products applied directly to Lockheed for the Super Constellation are four rotary switches to position the primary altimeter and air and water doors.

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Other Barber-Colman products on the Super Constellation include flight deck temperature controls... gas turbine engine cooling controls... auxiliary ventilation controls... windshield MSA controls... other a/c and accessories.

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# Design

# Research

# Development

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would be at extremely high altitudes where radiation heating would be the predominant source of input. In such a case, it is conceivable that coolant could be circulated internally on a closed system from the cold side of the radiator to the surface exposed to radiation. Because a fluid amount of coolant would be required, it would necessitate the weight penalty involved in carrying the gas or liquid.

Other possible schemes include the use of circulating coolant on the skin. This could conceivably resolve many problems but likely to be overcome with—method of heating the radiation to the skin and the degree of con-

duction smoothness which would have to be attained in maintaining radiation. Still another approach is the simple expedient of making the surface, skin of the aircraft thick enough to absorb sufficient heat to keep the internal structure relatively cool. In hypersonic flight, some of the thick structural right web areas, but enough weight remains to assure structural integrity for completion of the flight. Here again one of the controlling factors would be the weight penalty of the thick shell.

#### Boundary Layer

In connection with aerodynamic heating on airplanes, transition from

laminar to turbulent boundary layer is another intense study of Aero. It is known that the laminar boundary layer remains much less hot than the fully turbulent counterpart—perhaps only 1 or 2 in. mesh.

Then if research reveals how the transition from laminar to turbulent flow can be delayed, the heat input to the skin and the structure beneath could be lessened considerably with the result that lighter structures could be designed for the airplane.

Researchers don't expect that a cool way exists will take care of all the heat generated on airplane surfaces at very high speeds. Some of the heat will flow to internal structure and, in periods of relatively prolonged flight through the atmosphere at high speeds, the heat soaked up in the airplane might be considerable. The structure will have to be designed with sufficient margin of safety to withstand the increased thermal stresses.

Mathematicians involved in the solution of the heat absorption problem in airplane-structure generally use computerized heating in new airplanes. A heavy gun will give an approximate week longer than the skin about it, ribs or stiffener members would have stiff when heat values.

#### Current Simulation Heat

In speed solutions to the structural heating problem, Aero researchers have developed an electrical analog. Any of the device (previously) is to eliminate necessity of building complex, sophisticated structures for thermal study, along with costly, heating component.

The analog is simple and flexible. Electrical resistances are used as the equivalent of thermal resistances in the structure. Current flow is directly related to heat flow. Voltage drop between any two points is equivalent to temperature drop between corresponding points in the structure. Components show electrical capacity and as a structure shows heat. When a condenser is charged it means that potential and has stored a static electric condition and upon discharge the flow to another part of the analog to establish another open circuit condition.

In use, the analog accurately shows factors most critical such stress in combination of steady, unsteady, specific heat of the material resistance to flow across joints. Temperature and characteristics of the boundary layer also are used. Known, and are obtained by wind tunnel and other techniques.

Aero researchers effectively design started the accuracy of the electrical analog with reference to a segment of a wing structure consisting of a portion of skin and its supporting structure. In the new test the actual structure

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THE SECRET of the extraordinary new bearing is the ability of its sintered sintered bearing cage to retain many times reserve supply of oil. Each cage contains an oil reservoir, which prevents bearing failure even when all outside lubrication has been interrupted for hours at the tremendously high speeds and temperatures developed by jet engines.



# HYATT

ROLLER BEARINGS

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engine, a heater mounted on the outer face of the sintered sintered bearing. Thermocouples installed in the disc and in the sintered body were connected through amplifiers to dual potentiometers, measuring disc temperature, the other bearing temperature.

With heat applied, disc temperature rose rapidly, while bearing temperature hardly changed. At the end of the heating period, disc temperature reached about 350°F, while the bearing body remained at only 140°F. The conditions would cause warpage in the structure with possible buckling of the disc. With heat turned off, both temperatures continued to rise, indicating the large thermal lag involved.

Standard temperature differences of this magnitude are characteristic of high-speed aircraft, Ames researchers say.

Establishing the bearing's performance, researchers had its axial set up on the back of a dual potentiometer similar to that used for the actual structural segment. Current was fed into the contact at points in segment face of heat into the segment model. Volting was measured at points corresponding to locations of the thermocouples in the disc and sintered body. These voltmeters were mounted into equivalent temperature values have shown in dual potentiometers.

With the switch thrown the current flowed into the analog. Potentiometer

seized as they did for run with the structural bearing model—disc temperature rose faster than both temperatures, and each reached the same value as before, 350°F for the disc, about 140°F for the body. Log observations also taken of a similar.

### Wing Distribution

An analog analysis of surface temperature distribution for a supersonic wing also was presented to illustrate a typical practical application of the electrical device.

Conditions assumed that the plane was flying at 45,000 ft and accelerated from Mach 0.8 to Mach 1.5 in three minutes, after which speed was held constant. The wing a double wedge configuration with a 6-ft chord and 2-in. thickness, was assumed to have a thickness-to-chord ratio of 1/30. Wing was flown at an angle of attack of 5 deg.

Upper wing surface temperature distribution, as computed by the analogy for two minutes after onset of acceleration, revealed some characteristic variations in temperature at the free leading edge. Progressing aft, there was a transition region from laminar to turbulent flow just forward of the double wedge peak at the wing center about point.

This in turn, resulted in buildup of temperature along the aft portion of the wing to the trailing edge, exceeding the values for the portion aft of the leading edge. As heating continued,



### Shadowgraph Shocks

This is the flow pattern behind a simple configuration of a slender model shown by the shadowgraph technique. From a 1-in. nozzle, air was fed into still air at NACA's Ames Aeronautical Laboratory, the model is operating at Mach 1.6. A pressure sensor situated downstream in a high intensity electric spark. Drop of the shock wave pattern from the model is measuring. Strong shock waves at nose and ahead of wing and all show clearly, weaker shocks show in light lines. Turbulent wake behind the model shows dark lines characteristic of vortex formation.

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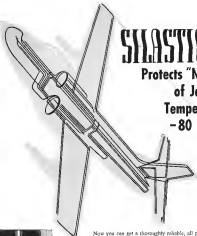
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temperature variations become more pronounced.

First minutes after acceleration start, the lower surface becomes hotter than the upper surface, which would tend to make the wing warp upward.

Big factor in investigation of hypersonic flow and aerodynamic testing is the development of a variety of equipment to provide data at the speeds involved—no single piece of equipment will provide all the information.

Thus, the investigation of forces which influence aerodynamic testing, such as rate of heat transfer, boundary layer separation, effects of cooling devices and how these factors are influenced by changes in Mach number and aerodynamic shape, is being carried on in Ames' new 10x12 in. heat transfer tunnel the new five-foot-diameter, four-in. long, supersonic free-flight tunnel, 10x10 in. supersonic facility and others.

In the new heat transfer tunnel, the air supply is heated so that true boundary layer temperatures and heating coefficients are duplicated at hypersonic speeds, to provide quantitative data for the electrical wiring.

The new low density tunnel gives no pressure measurements at speeds over 100,000 ft./sec. It is used for determination of heat transfer rates at these heights.

## Armed Forces to List 1956 Tool Projects

Deadline of July 25 has been set for Army, Navy and Air Force to submit to the Defense Department their proposed fiscal 1956 reserve tool and tooling projects.

With a warning that funds are limited and requests must be reasonable, T. D. Phipps, Assistant Secretary of Defense for Supply and Logistics, has told the armed forces they must consider machining for design and tool under development as well as those of current design.

He offered will consider requests only for tools and production equipment "required during the first year of mobilization and having a manufacturing cycle time of six months at most, or an anticipated mobilization lead time of one year or more."

## Tools Ordered

U. S. Air Force has awarded \$11 million in contracts for long lead-time and clear tooling support for mobilization.

Milling and broaching machines will be made by General Machine Works, Chicago; Fastlane Division Weaver Corp. Co., Buffalo; Detroit Branch Co., Detroit; and Laporte Machine Tool Co., Madison, Mo.



McDONNELL F4U PHANTOM tail twist is shorter Navy twinjet fighter outburst during simulated crash landing at NACA's Lewis Flight Propulsion Laboratory, Cleveland, Ohio. Left and right power plant planes are being separated long in a specially designed design principle used in reducing airplane crash and fire casualties. Forward and light power plant planes also been used in the controlled crash tests. The aircraft group has successfully demonstrated experimental testing system designed to cut the hazards including high-pressure water spray onto hot parts to cool them (AW July 5, 1954, p. 31).

## NACA Probes Crash Safety



SIX DUMMY PASSENGERS ride worn-out transport plane used in NACA's crash safety experiments which are providing data on impact survival. Seated in different portions of the airplane and in various positions the dummies carry sensitive instruments to measure crash forces. Also evaluated are conventional seats and experimental shock-absorbing types designed in NACA which have making members that fit in form a protective pocket around the occupants (AW July 26, 1954, p. 35). These tests also investigate a great number of those aircraft safety problems that are involved in general terms from testing. Some. Lewis Lab crash test studies that for have utilized 370000 military aircraft.



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## Rebuilding of German Aviation Research Units Off to Fast Start

Bonn—An independent research organization involving all the sections of the Deutsche Versuchsanstalt für Luftfahrt (German Research Institute for Aviation) is being built up at the Esson-Mathiesen airport.

The new group will continue the job of DVL begun in 1932 and carried on until 1945 when the facilities at Melsdorf near Berlin fell into Russian hands and were shipped to the USSR.

Some time ago, the new DVL research work on its new site at the Esson-Mathiesen airfield. The construction of hangars is almost completed the runway for dual flights is being put in order and the construction of a building for two DVL institutes will soon be started. Two other institutes for high frequency engineering and for thermodynamics and fuel research are still under construction.

The research center is to house eight DVL sections specializing in high frequency engineering, thermodynamics and rocket studies and three subunits, two dynamics, thermodynamics and fuel research, rocket propulsion, materials research, glider balloons, parachutes and powerplants.

Other DVL institutes are working at Aachen, Bonn and in Bremen. The Institute for Physiological Aviation Research will remain in Bonn and it is

to give a branch office at Bonn-Melsdorf where the applicants for the Luftwaffe will still undergo their physical qualification tests.

The Institute for Aircraft Fuel and Lubricants will continue at Melsdorf.

Close cooperation exists between the DVL and the Aerojet-Rohm Research Institute at Gumpelshausen in Bavaria.

It is expected that the Federal Government (the United States and the relevant industries will raise the necessary funds for the Esson-Mathiesen project.

Meanwhile, work in the individual institutes is steadily increasing. In fact, where the majority of the research is concentrated for the time being, it is possible to test gas turbine rotor, to watch experiments in wind tunnels, or to use models of new jets or other propulsive units.

In this connection, Professor Seebold, the chairman of the supervisory board of the DVL, said: "It is one to be feared that apart from the price and turbine engine which are already in two engines working along the principle of pure strength or at the least, pure lifting, developed which have been known in Germany since then and to be built into the V-1, will in the near future, be of some importance. Such



Blusbury Blower

During engine's lifetime, atmospheric air will cool, and then the customer will bring and blowing equipment, to give the point that built the icing tunnel, once in test operations at Boeing's Plant 2 in Seattle, Wash. With a 15-hp unit, test section, the second unit, a model or a small test

ing wind up to 250 mph, and drop the temperature to as low as -30F. The tunnel is fed by cold air from a climate room used to test aircraft components under cold conditions. The engine's hope to substitute these blower that do not need cooling equipment can be simplified.

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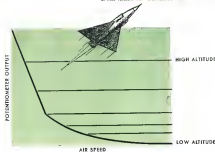


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propellers must contain only a few tire moving parts, owing to their simple construction, it will be possible in the future not only to avoid many maintenance problems but, in conjunction with the propeller made as we today, these simplified mechanisms will also be cheaper.

Since in other countries, too, the development of these new kinds of propellers with no tire has been started on a broad basis, the chances for German industry in this particular field seem very promising.

Stress tests on turbine blades are being made in the Institute for Turbo Engines. For this purpose, a test gas turbine of 500 hp capacity was specially developed. A photoelectric cell measures temperature by the intensity of radiation from the blades. This device also serves to test the working life of the turbine blades.

Research concerning the behavior of microorganisms under the meteorological conditions of the West German area of which Berlin is known as far as being conducted in the Institute for High Frequency Engineering. Attempts are being made, in conjunction with the Meteorological Station at Rheinfelden-Wertheim of Bonn-Nachrichten, to find the reasons for the interference effects of rain and snow on radio operations. Experts say that these investigations may open up new possibilities for more accurate weather forecasts.

The Institute for Physiological Aviation Research will also investigate the

important question of noise and vibration during flight and their effects on human beings.

At present, a total of about 50 test aircraft and aircraft in service of the DVL exist.

## IBM Gets \$3.5 Million Certificate of Necessity

International Business Machines Corporation of Poughkeepsie, N. Y., has been granted a \$3,570,000 certificate of necessity for research and development of electronic systems by the Office of Defense Mobilization with

50% of the amount allowed for rapid tax amortization.

Other certificates recently issued were:

Vince A. Edison, Inc., West Chicago, N. J., military aircraft armament: \$180,011 certified with 50% amort.

Covert-Gillette Corp., Wright Aeronautical Div., Westfield, N. J., research and development, military aircraft: \$1,322,000 certified with 50% amort.

Def. Aeronaut. Corp., Westfield, N. Y., military aircraft: \$150,000 certified with 50% amort.

Lathrop Aircraft Corp., Miami Springs Division, N. Y., N.Y., civil research and development, guided missiles: \$1,638,957 certified with 50% amort.

Goodman Aircraft Corp., Alton, Ill.,

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### Optimistic Outlook

Defense Department has received from industry some conflicting opinions on the proposed revision to AFPR Series XV (AW Feb 4, p. 14).

While the defense business does, say it prefers the existing regulations, the Machinery & Allied Products Institute has pointed its comments with words of praise for the revision.

Says the Institute:

"To ground, the proposed revision appears to be an improvement over the present regulatory language which it is designed to amend. The proposed amendment is well written, comprehensive in its language, and it is to be commended for its inclusion of certain contract cost items not previously specifically named in procurement regulations.

"However, we feel useful the new pattern of the regulation, which includes as its main item of cost a definition, a reference to the contract of availability or unavailability, and a specific provision as to whether it is an special case. Good provisions are required to make the item allowable in a contract cost."

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military aircraft parts, \$280,755 contract with 61% allowed

United Aircraft Corp., Pratt & Whitney Aircraft Division, 1001 Hartford, Conn. military aircraft engines \$203,000 contract with 60% allowed

Rohr Aircraft Corp., Clarksville, Md. military aircraft parts \$142,476 contract with 60% allowed

Lockheed Aircraft Corp., Burbank, Calif. military aircraft \$108,189 contract with 60% allowed

The Ryan Aircraft Co., San Diego, Calif. military aircraft parts, \$12,425 contract with 61% allowed

Rayson Corporation, Newark, N. J. electronic assemblies for military aircraft \$1,185 contract with 61% allowed

The Glenn L. Martin Co., Baltimore, Md. military aircraft \$68,190 contract with 60% allowed

Fairchild Engine and Airplane Corp., Stratford, Conn. military aircraft parts \$11,000 contract with 60% allowed

The United Tool & Die Co., West Hartford, Conn. military aircraft engine components \$70,877 contract with 61% allowed

## Magnetic Clutch Improves Torquing

A magnetic-clutch process had this torque-up across or nuts within a tolerance range of 10% of specified values, but has put its production in Chicago Pneumatic Tool Co.

The new Magnetic screwdriver, already at work at North American Aviation and General Motors in job 74 tests faster than the conventional method of partially tightening a fastener with a power tool, then applying correct torque with a torque wrench.

Ray J. Coffey, company president, claims:

Available the biggest benefit offered by the tool is that it takes the guess work out of torquing fasteners with power tools. With a rubber-type pneumatic screwdriver, the linemen the tool is held on a screw, the lighter the screw gets, because of the clutch's humming action.

The Magnetic stops near the desired torque is reached; it will not tighten the fastener further, regardless of how long the operator holds the tool on the screw, Coffey says. It prevents desired torque to be applied consistently over high production runs without reliance on operator skill.

An motor tool can be adjusted to have the motor stall at a predetermined torque (without damage to the tool) by regulating its pressure to the tool. However, Chicago Pneumatic says the system works reversibly with only when screws in items below 900 psi. Only that speed, critical variables introduced by the flywheel effect of starting parts make accurate torquing impossible.

Another benefit, particularly applicable

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The performance of the Regulus missile, developed and produced by Chance Vought Aircraft for the U. S. Navy Bureau of Aeronautics, is measured by RREP Telemetry Equipment. Tactical versions of the Regulus are designed for operation from ground bases, from shipboard and from submarines.

Vital in-flight data is accurately transmitted to the telemetry receiving system for both on-the-spot observation and for recording for further analysis.

RREP Telemetry Transmitting Equipment has demonstrated its accuracy, ruggedness, and reliability during the Regulus flight test programs. Test versions of the Regulus, recoverable "birds" fitted with leading gear and parachutes, at the missile tests, have served as many as fifteen flights, and RREP Telemetry has been on the job reporting accurate performance on every flight.

Technical literature available on request

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- d. Shield connecting sleeve
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accept a wide variety of inputs and is adaptable to any coded decimal or straight binary output. The broad versatility of the equipment permits a multitude of applications to military and commercial groups requiring fast and accurate recording in the reduction of test or collected information. For the most direct and effective solution to your particular data handling or data recording problem, consult Librascope's engineering staff. For further information, write today

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## Navy Contracts

Contracts recently awarded by the Navy's Aviation Supply Office, 700 Barbican Ave., Philadelphia 15, are:

**Boyd Products Inc., Seattle** Aviation Corp. made first bid, construction and maintenance parts for various naval aircraft \$11,140.

**Continental Air & Rubber Co. Inc.**, 1141 E. Myrtle St., Akron 18, Ohio, \$544.00.

**Grumman Aircraft Co.**, 1440 East Ave., St. Louis 8, Missouri \$20,000.

**Travelling Air**, 1141 Myrtle St., New York 17, N. Y. Aircraft components and materials \$40,000.

**General Electric Co.**, 1440 East Ave., St. Louis 8, Mo. Aircraft parts and materials \$40,000.

**Jack & Nelson Inc.**, 1244 Broadway, Cleveland 1, Ohio \$20,000.

**Aviation Engineering Co.**, 319 Church St., New York 1, Ohio \$20,000.

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**CONQUEST F-102A** is redesigned prototype for production interceptors, changes include lightweight nose, wing fences, new canopy.



**FIN and fuselage** are mated through four structural members.



**FUSelage mating joint** uses one and half its former fuselage length.



**F-102A USES COMBINATION** of new design, integral ducting, etc.

## F-102 Production Tempo Quickens

Delivery of the first production Conquest F-102A to USAF marks the start of quantity production buildup for the all-weather interceptor.

Ordered under the Cash-Quang plan, production of the F-102A started slowly, was to slow at low rate while bugs were ironed out in flight test.

Subsequent schedule changes in the nearness of the plans have been made and will be attributed to the numerous number of production airplanes.

Buildup of personnel and facilities at Palmdale, Calif., has started, to meet F-102A deliveries. Palmdale will do all production flight test. New post job of guys with hand and drill given distinguishes F-102A.

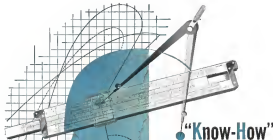




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## PRODUCTION



BY THE SQUARE—Taped devices to miller are taken directly from numerical data on tape, not from a master, as shown in photo.

## Automated Heavy-Duty Production Tools Available to Aircraft Firms

Complete automation of heavy-duty metal production machines has moved a step closer with the announcement by Giddings & Lewis of the commercial availability of their Numerical Electronic Control system.

Recent demonstration for Air Force and aircraft manufacturing officials showed how Numerical could control a G&L turret-type type and size milling machine. However, the company is also offering other heavy-duty tools, such as horizontal boring, drilling and milling machines, planer-type milling machines and vertical turret mills with the new automation system or modification of it. The tape-controlled system and the other products are the "plunge," "chamfer," "pocket" and "contour" tools necessary to mill jet engine cases and wing roots from 7527 aluminum plate.

The system is the result of three years of G&L-sponsored research at Massachusetts Institute of Technology and other research at General Electric.

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from one part to another. Deepen changes and modifications can be typed into the tape changer.

The Numerical system controls machining cycles involving as much as five machine runs and 12 numbers machine functions.

It is faster than other automation production, G&L says, because the tape system is made from simple decimal numbers, eliminating translation of these measurements into the binary form other systems require.

### How It Works

• Paper tape preparation unit punches a master numerical tape with decimal information taken from part drawings, defining data and machine tool sets. Special commands are entered in the same format, using an auxiliary tool hole. Checking circuit information determines if command is correct before sending, such as recording final holes, issuing load materials, setting plan in work steps etc. Statistical engineering-type computer can read.

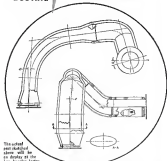
• Electronic measuring detector converts the tape's information into equivalent computer signals on a magnetic tape. The detector reads the punched paper tape, line for line, storing information results in special magnetic memory units. Later commands from the detector release this information to use control system units or directly to data-conducting circuits for final response on the magnetic tape. While the detector is processing one group of commands, following groups are being read.



COMPONENTS of Giddings & Lewis Numerical system of machine tool automation

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flexible sections**



The actual steel ducting shown will be as display at the Los Angeles International Show.

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**FLYING HOODS** are made in an almost unlimited range of sizes and types to meet the most advanced requirements.

The ducting assembly illustrated above is typical of many aerospace systems developed and fabricated by Flexonics to meet the rigid demands of both performance and safety.

This particular duct is made for a new high altitude fighter and is designed for operating temperatures up to 700° F. Utilizing its design, the combination of stainless steel and flexible sections provides required functionality. It is formed from Flexon straightwall stainless steel tubing, not lap joint, welded together. The entire unit is insulated and the insulation sealed in a stainless steel outer shell to prevent leaking of vapors into the duct.

Flexonics Corporation is a leader in fabricating ducting of this type resulting from 53 years' experience in the construction of flexible metal components. Put this know-how to work for you... it is your best assurance of getting the quality you need in your ducting requirements. For specific recommendations on the installation of your ducting problems and on outline of your requirements.

into it to assure continuous motion of the machine on playback of the loaded tape. The tape preparation and electronic director units are independent of the rest of the system and may be located some from the shop area.

Inherent accuracy of the magnetic tape is better than .0005 in., permitting machining accuracy within .001 or .002 in., G&S, says.

System commands are easily indicated on the tape. These can be used to warn the operator of approaching or specimen stops and completion of the machining cycle. If a machining program is interrupted by tool breakage, the operator returns the tape to its last stop signal, retires, and restarts the system's tape reader. Automatic control returns at that point and can track to the end of the cycle.

•Electronic playback control, which sends signals to the machine.

•Electromechanical control units, which position the machine's axis in accordance with electronic commands. Precision control of machine cutting leads is accomplished through servo drive electric motors. Continuous laser beam, operating in closed loop circuit with the machine's tape reading heads, report on the position of the various tool heads. Documentation continuously compares the input and output results, balancing out differences to make sure that the cutting heads are exactly where the tape wants them to be.

### Flexible System

The Numerized system may be used in several ways in addition to operating on manually controlled tools.

For instance, the machine control portion of the system may provide its own tapes for magnetically recording tool head travel over a template. Or a recorded tape may be produced by

### New Aero Dictionary

A new unabridged dictionary, reflecting the current state of terms peculiar to aviation, is being compiled by the National Advisory Committee for Aeronautics under the direction of Dr. Frank D. Adams, an experienced lexicographer. Publication is expected in 1957.

It will be the first such publication by NACA since its 1943 edition of *Report #74, Nomenclature for Aeronautics*, regularly used in 1954.

Future work will be indicated, but established usage—even though less desirable—will also be included.

NACA had received some reports for a revision of *Report #74*, the official report came from Dept. of Defense.



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having an operator put the machine through simulated machining motions as a "dry run," or having him actually produce the initial part. Scorchin, attached to the lead drive, started the exact machining process, at the same time eliminating tool-cutting intervals of more than 70 seconds from the top, in machining a nose or fin contour where the type is placed back later.

Ciddings & Lewis use standard, commercial components, with established reliability, in the Nutamatic. Most of the electronic circuits are printed. Vacuum tubes are computer quality, mounted for long life and set in plug-in boards for simplified checking and maintenance.

## PRODUCTION BRIEFING

► Fiber glass fiber reinforcement in abrasive cutting-off wheels provides a high safety factor up to speeds of 15,000 ftm, according to Carborundum Co., Niagara Falls, N. Y. Wheels show a flexural strength index of 7,000 and impact rating of 400 ft-lb/in. in, providing a burst speed of up to 30,000 ftm, compared with about 20,000 ftm for unreinforced wheels and 27,000-32,000 ftm for wheels reinforced with other nonoxide fibers, the company reports.

► New method for using abrasive pigments in a cutting without resorting to use of metallic abrasive wheels by emery machining, is used by Eth-Nic Corp. Co., Chicago, to offer high potentialities to the search engine and leading part industries. Process, called McGonagane, is based on use of a rigid weaving material lubricated in the desired shape, the material being recovered from the cutting by a chemical process.

► North American Aviation, Inc., Los Angeles, Calif., has been cited by U. S. Atomic Energy Commission for accomplishing more than 1 million man-hours of repair-work in the nuclear energy field.

► Almost half of all electronic equipment now produced is purchased by the Defense Department, according to Frank D. Newberry, Assistant Secretary of Defense.

► Infill wires in developing conical center-bar cutting tool material is reported by Corbin Electric Co., Detroit, Mich. \$88 in the laboratory stage, the material is used to provide good tool life at 1,000 ftm speeds. At 6,000 ftm, feed and depth cut of 0.100-in. at that speed, the tool lasts 75 min. in machining 3045 steel annealed to 170 BHN.

Corbin states. The new material is brittle, requiring special understanding of its use, but the firm's engineers feel that it will supplant tool steel.

► World's largest reinforced plastic press is what Hydraulic Press Manufacturing Co., Mt. Pleasant, Ohio, calls 500-ton capacity and it has built for Zenith Aircraft, a Division of Zenith Aircraft Co., Gardena, Calif. Press size is 74x104 in.

► Gear Hydrolics, Inc., Janssen, N. Y., has opened new and larger offices at 6736 Lenox Road, N. Hollywood, Calif., in charge of Ernest O. Gibson, Jr.

► National Co., Inc., Malden, Mass., electronic manufacturers, has leased additional area in Malden, Mass., and moved its phone and parts divisions elsewhere in the location.

► Four 4-1/2-in. disks of Corbitt 60 have been shipped by Brookline National Laboratories, N. Y., to R. F. Goodrich Research Center, Brookville, Ohio, for use in rubber and plastics studies. Corbitt is the package to be used by Goodrich in test to give all radiation comparable to that provided by 1,100 grams of radium.

► Wiremesh bending process that operates with low-pressure heating temperatures requires no flames and permits simultaneous multiple bending operations, Standard Steel Division of Wolf Calcium Corp., reports. The

Detroit firm states that the process is applicable to any wire mesh and even wire reinforcement generally constructed in joining beams.

► Napco Chemical Co., Harrison, N. J., anticipates a 25,000% increase in use of bonded plastics in the next five years, and accordingly has authorized a 51 and 100 expansion program to increase plant activity in urethane and vinyl forms. Firm will build a new plant in New Jersey and Los Angeles this year and is planning a third.

► Casco Corp., Van Nuys, Calif., has added 65,000 sq. ft. to its present facilities. Firm specializes in metal equipment.

## Iron-Steel Markings

### To Be Standardized

Uniform markings on selected iron and steel products are required by the Defense Department under terms of Military Standard 133, to be distributed to industry about Aug. 5.

Marking will include manufacturers' name or trademark and the composition and mechanical designations commonly used. They will be applied to the product by the producing mill.

Purpose of the standard, according to the office of Thomas F. Pitt, Assistant Secretary of Defense for Supply and Logistics, is to provide positive identification, cut down on manual stock and facilitate collection of existing stocks and supplies.



## Optical Alignment

Cauldwell tooling techniques use optical techniques for establishing alignment and feed points on jig for C-130 wing panel. Cauldwell is building the C-130, master model assembly of the Boeing-Bell Boeing long range transport for the USAF.

## American Electric Model EPM-1123



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Input circuit is equipped with a 60 cycle circuit breaker and motor starter. Output circuit is protected against both current and voltage surges with a circuit breaker and over-voltage relay.

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## LETTERS

### Landing Light Battle

I am a pilot and, let there be a hint to human endeavor and it is Guy Fawkes' letter on page 75 and 81 of the issue that gave me *Aviation* to read today.

Although very reluctant to engage in a heated battle, I am now doing so. Mr. Fawkes' letter and particularly the last two, display such stark disregard for facts that I feel the contention is settled, your contention is in order.

John Sweet's Radio-Matic has been cited the master of display lights. I have never heard him deny that, but it has been an impression from years back that the inventor of the display lights was Joe Sweet.

In fact, I and others who make a name given our first introduction to the display light first, in Joe Sweet's in the office of the Cassinair Building, Washington, D.C., where he had assembled a working model of such lighting.

Mr. Fawkes has stated that there was some agreement as to display approach lighting among pilot participants in tests at the Experimental Landing Station at Annapolis and that the only dissenting opinion for ALPA representative.

Other Dissenters: This is far from the truth. It happened that I, as ALPA representative, was a consistent and strong dissenter as well as other pilots who participated in the tests.

Mr. Fawkes perhaps has forgotten the opinion of Southwest Airlines pilot representative that they preferred the centerline lights to the display.

Due to the limited amount of information coming out of Annapolis (information which was under the direction of Mr. Fawkes), it was necessary that the ALPA representative be present and participate in all test sessions.

Our criticisms and reports were quite at variance with Mr. Fawkes' would like to have it known before and in fact, we found the display system to be completely inadequate and under some conditions, hazardous.

In an attempt to correct some of the deficiencies of the display system, lateral bar lighting is being added and the lights are being changed from red to blue to help differentiate from runway lighting.

When red lights were placed over the light system a loss of 60 to 90% resulted and the system obviously became a low visibility system.

These display approach systems were not effective in overcoming the deficiencies which were basic and inherent in the design.

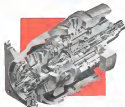
Division 700 performs the application of the results on the charts found in the magazine's editorial columns. Division 700 is the Editor, Division 700, 230 E. 42 St., New York 36, N. Y. I have been under 700 words and also a genuine disbeliever. We will not print anonymous letters, but names of writers will be withheld on request.

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#### SERIES 67 FIXED DISPLACEMENT

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## • LETTERS

line system, as 1, 8. Solvent has no effect and is easily removed.

■ **Shoplex Cords**—An installation of the shoplex lights was made at Los Angeles and within approximately one week a USAF C-47 overestimated or misinterpreted the lights and landed between the slope lights. The aircraft burned but passengers, crew and cargo were evacuated without injury.

The second at Los Angeles, Washington, and Midvale are full of more crabs due to photo monitoring the dopamine light for two way lights. Fortunately, they were able to pull out as time, though many came very close to crashing.

Another very bad deficiency in the cockpit was that if both runs of the approach lights were visible the pilot received the very strong impression that he was making a too steep descent or that the runway was tilted uphill. This kind of impression is very dangerous under lower visibility conditions.

► **Containing Fumes:** Another trouble, common to all diesel engines, was the fact that under really low visibility conditions both crews could not be seen simultaneously and during foggy tests very often one crew would be picked up without knowing whether it was the right or left one and would be there as a result, not at all.

Several basic phone numbers the right hand was for the left. There was a clump of tall trees adjacent to the right side and it was necessary, for OCA to advise, prior to pull up as he was headed for the trees.

"Mr. Proulx is not a pilot, nor does he understand the basic fundamental fact that a pilot in formation from instrument to contact flight does not have time—I repeat TIME—to sort out and interpret a lot of confusing and at times conflicting signals like information provided to the pilot in the form of visual aids must be natural and useful as possible clearly unambiguous visual clues which he normally receives in contact situations."

"Much more could be said on the deficiencies of the chapelain system, but as Mr Gilbert so aptly put it in the Age 11th issue, 'the chapelain system has been rejected by plenty all over the world, and not by a small and unrepresentative group'."

Mr Pearson stated at the June 1986 letter, and I quote therefrom, 'Mr Caban apparently, is not free from an evident and stated bias as an approach light. He, however, has developed a petition which is a modification of the crystalline with a series of horizontal cross bars. He is also some what less than frank in stating that no accidents have occurred on approach or crystalline runways with cross bars.'

"It was reported that several crates, assumed to approach on this pattern at Berlin during the attack and at Newark a very embarrassing test approach on the full ALPA contact pattern, complete with one downer discharge from both, plowed up the marks over a couple of hundred feet to the left of the approach on Oct. 10, 1945."

I am quite sure Mr. Calvert is capable of answering Mr. Farnum as regard to the Berlin Airlift because, I personally, do not know of any accidents on Mr. Calvert's controlled runs has none during the war.

✻ **Newark Accident**—As to Newark, the accident occurred on May 21, 1911 at approximately 0400 EST, not Oct. 16, 1951. Aircraft was an aircraft on scheduled service.

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### • LETTERS

and not a lost aircraft. According to this survey of the CAB hearing, the captain saw the lights well off to his right and he leveled off but did not change power setting which caused aircraft to sink rapidly. Full power was applied when aircraft was dangerously low and almost simultaneous contact was made with the runway. The resulting bounce made the aircraft ground contact on the airport proper which was traversed in a landing along side the runway.

On this particular morning, I participated in 15 test approaches and landings at Newark for purposes of approach light installation. As a matter of fact, unfortunately, there has never been an accident involving a low visibility test landing at Newark and none of these landings were made in 400 foot visibility.

Mr. Pearson would like to have it appear that continuous discharge lighting is too rough in the Newark terminal system as it is.

Again, the same point over and over.

• **Continuous Discharge Lights**—This pilot considers the reported failed continuous discharge lights as the best of the system and all at least equal convenience in other components of the entire low vision system.

The continuous discharge lights provide only identification and measurement of steps used for no reason of any which can be provided by fixed steady burning lights and actually, in part at least, due to some grounds better fixed steady burning lights can be seen. They under the lowest visual conditions. When standard eye distance, the lights from 500 to 2,000 feet before, you can expect to see fixed steady burning lights and at the most critical time of the entire approach, namely the transition from approach to land.

But from being a pilot, the pilot considers the continuous discharge lights as essential and so demanding that they be made a mandatory component in the National Standard for approach lighting.

• **Low Visibility**—Mr. Pearson would like me believe that continuous lighting as contained in the National Standard for approach lighting is only good down to approximately present operating minimums of 500 foot ceiling and 1 mile visibility, whereas unfixed lights and such equipment with scheduled low center operations have shown this system to be remarkably adequate for approach and continuous of visibility wherein pilot was unable, after crossing runway threshold to land properly, or to hold in descent as he lowered the aircraft down due to deficiencies in present day runway lighting.

Again Mr. Pearson has raised the best. The pilot's problem at this time when operating with the National Standard continuous lights are in line with continuous discharge lighting, it still needs approach lighting but with runway lighting. It also appears that recent developments with fixed type runway lighting give much promise of receiving present runway lighting deficiencies.

J. F. Galt,  
Pilot, Eastern Airlines  
31 River Road  
Clarkson, N. Y.

(John Galt, EAL's Chief Pilot, New York Area, is well known for his work on approach lighting. In addition to being Air Transport Ass'n's representative at the

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inspection of jet engine blades!



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## LETTERS

*Article approach lighting tests. Is it responsible for introduction of the emergency landing conditions discharge lights now used as an aid to landing in reduced visibility at airports throughout the world. In 1951, he was selected by Flight Safety Foundation to receive one of the annual Alexander Weiss safety awards for his work on the field. Capt. Gill has been with Eastern since 1953, and before that had logged 5,000 hr. of flight time in the Army Air Corps—RST)*

## Whose N3N?

Apparently you have had your members at NAF in Philadelphia, Missouri. But would have read a list and say over your caption under the picture on page 82 of the issue it says that started with. The last of the Yellow Peril, and said in it so that the N3N of the Navy-built version of the Boeing-Wichita (formerly Stearman) N3N version.

Actually the N3N was designed and built at NAF, originally with a Wright J1 engine, and later with a Wright J67 engine, it had no ground resemblance to the Boeing N3N. The structure was 100% aluminum, silver and covered with fabric except the vertical fin and the landing gear struts, the upper wing was not painted, despite the fact, without a center section it had sections on all four sides partly covered of just on the lower in the Boeing like landing gear was not covered at all the Boeing.

So you see the story that can be said for ourselves—day were both legends. We look forward to your magazine even more and thought the record should be set straight for the boys who worked so hard on this project at NAF. GEORGE TUCKER, JR., Pico, Georgia. You can, Inc. P.O. Box 100, Edgewater, Pa.

## Help Offered

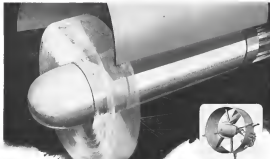
Aircraft instruments have really come along, says *AVIATION WEEK*, June 15, 1955, page 96, in its review of *Illustration* from 1925 to 1955. A prominent instrument in the same way may find all sorts of two-color and "displays" not in full of its field instruments.

*Photo.* There has not been any improvement in the legibility of instruments and before an instrument is made, it is made from 1925, and the illustration accompanying your article and "displays" page 97.

It's about time all engineering departments have not been involved in helping with and making the instrument, from the old, being made. Thus, with the success of any corporate typographer, commercial artist, individual designer or any other, one of those who has a certain 1955 graphic, with some letter of hand, depending on reproduction techniques.

Of course the professional might charge slightly more for their services, but the existing wage scale of the hand-drawn letters, but flight crew would get more legible instruments.

JOHN T. HULL  
Advertising and Art Service  
624 Eighth Place  
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## Emergency Power in Seconds— Electric or Hydraulic!

**AIR PRODUCTS AIR-DRIVEN GENERATORS AND AIR-DRIVEN HYDRAULIC PUMPS GIVE POWER INSTANTLY TO FLY AND LAND A PLANE SAFELY**

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Manager of Research and  
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Edgewater welds rings, rolled from solid steel blocks, are made in diameters from 5 inches to 180 inches, and weigh up to 14,000 pounds. The cross-section drawings above show some of the shapes produced by the Edgewater rolling process. Simple or complex sections are accurately formed, minimizing machining operations, and reducing material costs.

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WHITE: Six free booklet describing how Edgewater Rolled Steel Rings are made and showing some of the rolled sections produced by that process.



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PITTSBURGH 18, PA.

move passengers to the plane with maximum capacity

Excitation is cold stored from troughs under the spars and be positioned against the plate in the same manner as the container belt spars.

Control Testament spokesmen feel that their three means of allowing airline passengers to board their planes will be a big step in making air transportation a first class operation from the minute the passenger puts himself in the care of an airline to until he arrives at destination.

## American Opens New West Coast Hangar

A new, million dollar maintenance hangar has been put into service at San Francisco's International Airport by American Airlines.

The hangar can house two DC-7s at a time. Its doors have circular cut-outs to allow the tails of AN's various planes—DC-7s, DC-6s, DC-6Bs and Carvairs—to protrude through adjacent side doors.

The facility incorporates a "level stock," a push-button-controlled section of steel floor that can be raised to stack, but brought to virtually all loading levels, and built around such as engines, then return to floor level.

With an eye to very heavy aircraft of the future, Aeronautics made the parking ramp adjacent to the hangar out of 1-ft-thick concrete.

Provisions have been made to expand the building both lengthwise and vertically, the office wing having been started to take a second floor.

AA has also leased an additional six acres at the airport in preparation for future expansion.



### Start & Tow Units

These models, starting and towing capacities recently completed for the Novosibirsk to Paris by Red Drom, Ltd. (Totnes, England). Ford V8 engines supply both power and electrical power. Units are powerful enough to tow large aircraft, with air skid design permitting passage under wings and fuselage. Current sales agents: Antonovs (Cessna Equipment), Ltd. (Coburg Airport, Healy, Smay, England).

## FIREBEE-600 MPH "BULLSEYE"



Before infires can be spread against jointed "heavy" targets, the technology that Flivver uses inside, which flies at altitudes above 100 m (or is 40,000 feet, much less the need for "high-altitude" jetlike jets to replace "fatigue" targets. A suitable target for jointed, heavy and multi-mission, and for evaluation of new weapon systems, the Flivver military must be used as: include use as a jointed missile or jetlike reconnaissance plane carrying in "army" flies. Air or ground launched, the Flivver is recovered by a unique stage parachute system. Low initial cost and recovery for repeated use makes the Flivver far more economical than aircraft destroyed to derive intelligence.

### Another Example of How

# RYAN BUILDS BETTER

America's fastest, most elusive target—the Finbore—is an outstanding achievement in advanced design. To meet the needs of America's air defense, Ryan engineers created this new platform through by skillfully blending their knowledge of aerodynamics, jet propulsion and electronics. For more than 32 years, our

diastrial and military leaders have called upon Ryan to solve the increasingly complex problems of aeronautical science. Building examples are the Fairbairn, Ryan's new jet VTO airplane, precision built components for jet, rocket and piston engines, and electronic devices for guidance and navigation.

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 <b>A-10 THUNDERBOLT II</b>  <b>OPTICALLY-CONTROLLED</b>  <b>STRIKES</b>	 <b>SHOCKWAVE BLAST-TO-DEATH</b>  <b>ROCKET-DRIVEN</b>  <b>ROCKET-DRIVEN</b>	 <b>RYAN</b>  <b>AERONAUTICAL COMPANY</b>  <b>100 0-1000 10, CALIFORNIA</b>	 <b>ATTACHMENT 10</b>  <b>ATTACHMENT 10</b>  <b>ATTACHMENT 10</b>	 <b>ATTACHMENT 10</b>  <b>ATTACHMENT 10</b>  <b>ATTACHMENT 10</b>
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 ELECTRICAL ENGINEERS, MECHANICAL  
 ENGINEERS, MECHANICAL ENGINEERS,  
 CIVIL, AERONAUTICAL ENGINEERS



## HIGHER PAYLOADS and HIGHER PERFORMANCE

The compact, lightweight rocket powerplant, designed by the U.S. Air Force on the X-45-AJ-1 solid-propellant rocket, has been successfully flight-tested on the Republic F-84F airplane. Used for increased thrust, this powerplant and its big brother, the X-45-AJ-1, which was successfully flight-tested on Boeing's B-47B Stratojet during 1954, have proved the principal application of rocket power to piloted aircraft.



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MORE POWER FOR AIR POWER

## BUSINESS FLYING

### Aramec Expanding Private Airlift

By Edwin J. Bellon

Aramec American Oil Co. is expanding its already large—55 million—private airlift, to provide the additional transportation required to keep pace with its oil production operations in the Middle East.

Aramec's aviation department provides vital air support for the company's 400,000-sq. mi. petroleum empire in Saudi Arabia, since 7,000 mi. from New York.

• August 1955, Aramec takes delivery on a specially built Douglas DC-6B/A that will replace the antiquated post-war aircraft. DC-6B/A is the company's new operator with two DC-6B/A's in the world scheduled from Atlantic service from New York to Dhahran, Saudi Arabia.

• Aramec is transferring its transferred and surface transportation of its trans-Atlantic fleet from Lockheed Aramec Service International to its own new 21,000-sq. ft. facility at N.Y. International Airport.

• It is adding a fleet of four Lockheed Canada Beaver Mk. 5's to the fleet replacing three Navajo and providing increased lift capacity in Aramec's Middle East field operations.

When current deliveries and deliveries are completed, Aramec's business aircraft fleet will comprise two DC-6B/A's, one DC-6B/A, two Convair 440's, seven DC-3's, two Beech C-119's and the three Beavers.

#### Eager With One

This is a giant stride from 1954 when the company operated a single Fairchild 71 on the desert in Kuwait, supplying and supplying Kuwait's oil. The two-powered international operation with its 17 private fleet works out of head quarters at New York and Dhahran. The former is staffed by 75 aviation personnel, including six aviationists from-Arabian coast, the latter employs over 150 people including approximately 15 pilots.

Top man in Aramec's Aviation Department is George Knepper, who spends about four months a year in the Middle East checking operations there. This year Knepper is working with an estimated \$5-million aviation budget which he figures will be split about 50-50 between trans-Atlantic and Middle East services.

Key factor is the big expansion current effort is the 35 billion barrels of oil estimated to be under Saudi Arabian sands, a prize so rich that



EMPLOYEES GATHER at Dhahran, Saudi Arabia, after 27-hr. flight from N. Y. in DC-6B.



SUPPLIES ARE UNLOADED from Aramec DC-3 at a company jump station in desert.

Aramec that has been present over 5,000 wells there and pays the Kingdom seven million to 50% of the oil produced in net operating income.

The know-how required to get this vast operation underway was supplied by thousands of imported American technicians who were not only concerned with finding oil, getting it out of the ground, transporting it, refining it and selling it but also personnel who had to construct and operate building

living quarters, hospitals, stores, docks, and facilities, radio networks, electric powerplants, motor pools and aircraft facilities for thousands of vehicles and scores of other jobs.

Today more than 5,000 American specialists work with about 14,000 Saudi Arabians and 5,000 others of about a dozen nationalities. Counting dependents, there are approximately 5,500 Americans in Saudi Arabia.

Getting the right men to the right

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where but in a two-fold manner that Kougher splits between his operations responsibilities in New York and Chicago.

### Trans-Atlantic Business

The American working force in Saudi Arabia is recruited under a four year contract that supplies them and their dependents with transportation to and from the States, with pay and allowances starting on date of employment.

Four gross personnel and their dependents 38 days vacation at the conclusion of the first two years, more at the end of subsequent years. The bulk of the contract is strictly enforced by American medical personnel.

The accuracy for checkbook phoning workload of thousands of contracting employees, in addition to transporting some employees, executives and high priority material without the delicate system bogging down in a paperwork nightmare, is why American depends on the World War II to set up its independent international air service.

The response found that traffic was sufficient to economically justify a private trans-Atlantic operation and the status was too high and the operation too complex to be left to some commercial airline operators.

Last year about 5,000 Americans per

sonnel arrived and departed at New York via the International Division. The airline carried a total of 25,000 passengers so far, including those that dropped off at one of the European stops enroute to returning to the States for vacations, or for business, and then were picked up on return trips to Dubai. Last factor averaged 1975, Kougher told American Wings. The International Division accounted for some 35.7 million passenger miles in 1974, in addition to 470 tons of freight, mostly cardboard, totaling 2.9 million cargo ton miles.

### 27-Hour Flight

On a summer schedule, a DC-6B leaves New York International Airport on Wednesday at 1900 for GMI service to Gander for a fuel stop at 2315, leaves Gander at 0045 and lands at Amsterdam at 2015. After an overnight stop, the plane takes off at 2330, arrives at Rome at 1515, leaves Rome at 1645 and arrives in Beirut at 2315. At Beirut, new employees are afforded to go to nearby Sabon for two-to-five weeks of instruction.

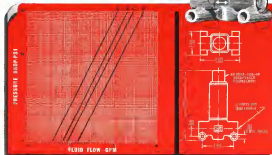
At 2345 the DC-6B continues to its terminus, Dhahran, arriving at 0400, total of about 27 flying hours. The plane leaves Dhahran Sunday and arrives in New York Tuesday. The other DC-6B leaves New York on Friday, arrives in Dhahran Monday, leaves Dhahran Tuesday and returns to New York on Thursday. The DC-4B leaves New York the following Wednesday arrives in Dhahran on Saturday, leaves Sunday and is back in New York on Tuesday.

Trans World Airlines supplies weather and communication services to Gander and serves the Atlantic, KLM Royal Dutch Airlines provides those services from Amsterdam, and TWA picks them up upon their return. Should the airplanes require maintenance or an engine, while in Europe, KLM and TWA provide necessary service. In more than 12,000 international trips since 1947, American has never rejected a passenger or crew member and averaged less than one engine change on each per year, Kougher noted.

Approximately 30% of America's people travel on commercial airlines, or charter themselves or specialists whose schedules are too tight to wait for an American plane.

Then there are special engine problems that require shuttling commercial aircraft. Last year American signed out a man to look down two high portable pumping units for an oil change on a vintage truck converted since the people would discuss oil production in 15,000 barrels a day. Two KLM DC-4s and three DC-6s hauled the 15,000 lb load seven in less than a week and it was operating a week later. When American gets its new DC-8B/A

# FLOW WEIGHT



Value Valve Part No.	Type	Flow Operating Pressure	Flow Characteristics
V-1000	Normally Open	200 psig	See Curve D
V-1001	Normally Closed	100 psig	See Curve D
V-1002	Normally Open	100 psig	See Curve C
V-1003	Normally Closed	200 psig	See Curve C
V-1004	Normally Open	200 psig	See Curve B
V-1005	Normally Closed	100 psig	See Curve B
V-1006	Normally Open	200 psig	See Curve A
V-1008	Normally Closed	200 psig	See Curve A

### SPECIFICATIONS:

- WEIGHT—15 lbs
- AMBIENT TEMPERATURE—max 60° to min 100° F
- MAX LEAKAGE—15 cc/hr full 12 cc/min max
- CURRENT DRAIN—15 amperes @ 14 V D C

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NEW VALCOR SOLENOID VALVES with the highest area of flow to weight of any valve made. They are low in weight (15 lbs.), low in pressure drop (see curves), low in power consumption (1/2 amp. at 24 V D C), and low in cost. No other Solenoid Valve has VALCOR's so completely dependent upon its so many critical applications.

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At Menasco all departments—research, development and production—work as a team to meet the challenge of stronger, lighter, more efficient and compact aircraft landing gear. That is why Menasco has consistently led the design trend. Typical of Menasco engineering achievements is this new gear for the Cessna 750. Menasco's proposal provided Cessna a saving of 15% in critical landing gear weight. This interesting design, now in service, combines the most effective application of both steel and aluminum. Menasco's advanced engineering approach to the weight problem can also be applied to your landing gear problems.

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next year, the company will gain an instant cargo capacity because of the plane's redesign. From landing station 150 forward, the transport will be a DC-6A with a top loading door on the port side to take 5,000 lb of bulky items. From the cargo compartment aft, the airplane will be a DC-6B with 26 seats in a forward passenger compartment, plus two rear compartments having eight seats making up into four banks, plus two doors. In addition to providing needed bulk cargo capacity, the new plane will ease fleet maintenance and operations problems after the DC-4 is sold.

The current DC-6B has 14 seats forward and 14 seats in the rear compartments. The DC-6B seats 18. Each plane has three banks for crew members. The crew consist of captain, first officer, flight engineer, navigator, radio operator and two cabin attendants.

#### Desert Operations

At Anasco's Dhadon base, an operations superintendent works his 18 shifts and weighs regular aircraft into



**GEORGE KNAUPER**, manager of Anasco's aviation department and owner of a 1400-hp car, is also the expert who makes the recommendations on new equipment. Starting his aviation career at an office job at the Lockheed and Vought air bases in Wichita, Kan., Knauper has since 15,000 flying hours. He became a U. S. citizen in 1927 and has flown for Pan American World Airways in Mexico, Central and South America, Africa and the Middle East. Commissioned a lieutenant colonel in the USAAF in 1940, he commanded the 12th Transport group at West Africa's Cold Coast. Subsequent assignments included operations in the North African Sector, AEC, 11th Air Force and the Air Corps Rescue Unit, Vietnam; command Allied Air Forces. He has twice been decorated with the Legion of Merit, received a Silver Star and four Air Medals. Knauper joined Anasco in 1945.

## Electronic equipment back in action at "tube-reheating" speed



#### For aircraft and industrial applications

It's now possible to get electronic equipment back into service just as quickly as vacuum tubes return to safe operating temperatures. . . instead of waiting the full time required to heat cold tubes. Quick-action Radair timing relay starts operation as soon as tubes have not completely cooled from previous operation.

The Radair timing relay has a reset timed to the cooling rate of the tubes. It automatically reduces the plate circuit in the split-on time that will insure full protection to the tubes and other electronic components. In radar equipment, quick-action Radair is a vital safety factor. In transformers and other industrial applications, it cuts lost operating time. Available for use on 115V, 400 cycle and 25V D-C aircraft requirements. Send for FREE BULLETIN 815 containing a complete timing curve and full data on Radair.

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a variety of scheduled and unscheduled services that cover flights between stops from 35 mi apart to about 1,300 mi, according to Mission. Mission includes occasional ad-hoc flights when a vehicle is stranded in the desert or a vehicle is required or has been forced to sit out of the isolated work sites.

The North American fleet puts in about 378 flying hours a month with over 60% of the operations being scheduled. Last year it finished between 1,950-2,000 tons of cargo (600,000 non-rolls and less 27,500 passengers) with 12.5 million passenger miles with an average fuel factor index of 7.95.

The global 400-seat Convair makes once weekly long-haul flights from headquarters to Beirut, about 1,000 mi, and Amman, Jordan, approximately 1,100 mi, and sometimes also flies the Middle East on two previous business flights. They each average about 50 hr a month.

DC-3s make half the pump stations, about 125 hr apart on the 1,000-mi base pipeline from Dhahran to Beirut. These models supply fuel and exploitation parties in the desert and make regular visits to the oil station network. Rough 100-mile personnel for construction teams and their supplies from the air. Boeing jets get out as needed to exploitation parties.

Again from occasional workforces remote aerial photographs, using DC-3s detail with cameras. American sales opera-

torial specialists for major aerial oil exploitation work. The flight and evaluation equipment and experience required for these missions is something that the company feels would take too long to acquire to be feasible.

Although flying conditions in the field for carrying the heavy exploitation parties have to be considered rough-and-ready by deterring pilots, who would also have to have such vital communication networks, American pilots have maintained a considerably better record with no fatalities. Year-round weather is satisfactory for flying, although the summer months' dust storms that link up to nearly 15,000 ft. are a major hazard. When a pilot sees one of these, he turns around or sits down.

Nagel's mission is to deal exclusively with a deficiency and leaving it on the pumps 200-400 ft. ADI meters. The exploitation parties use a standard one-kilometer step in the preceding work, which is generally south-southwest. An old but still a water is required to guide work direction. Generally the terrain is capable of taking a DC-3 flying 20,000 lb. of cargo. Knapier told Kenneth Wicks.

South Arabian watermaster hydrographer at Dhahran indicated some 140 x 340 ft. lagoon and a sports on entry north approximately 500,000 ft. The major technicals include maintenance and accessories are shipped back to the U.S. by boat and the work carried out to

scrubland. Pratt & Whitney gets the J2500s, Arrow, the K1830s and RB35.

Readiness time for engines run about 10 months from the Middle East to the U.S., although if the system is verified, run short, engine assistance go by air.

Donor flying does not require any particular stress on aircraft and their equipment. American Wicks was told but to be on the safe side, American gives to various equipment some 10% less time between overhauls than the manufacturer requires.

## PRIVATE LINES

A large U.S. rubber corporation was the first to sign up for National Airlines executive transport plan, under which NAL provides specially fitted Lockheed L-1049H jets over on a charter basis to business firms. American Wicks has learned. National supplies the planes at a single specific price, including all flight costs—fuel and insurance up to a 75-million maximum. Subscribers can purchase the aircraft later, with lease cost applied to the previous price. NAL has contracted for 10 L-1049Hs to maintain two airplanes and plans to complete the others by the end of this year.

Boeing-McDonnell Douglas 750 jet last place between glass flies the French Ambassador to the U.S. from Washington to New York, at approximately 95 min., averaging about 560 mph at 34,000 ft.

Bell 47C copier has been purchased by United Manufacturing Co., Chicago, to fight the firm's line of maintenance and technical detection equipment in a number of emergency use of copiers in several services. Another Model 47C has been sold to Frank Helleney, Corpus Christi. The air contract aerial services over 175,000 acres in South Texas to have tomorrow. Federal Bell 47C used in this operation. It is used with 56,000 worth of instruments, two technicians to operate and work.

All Shuman engineering data, service parts, tools and rigs and some old tractors have been sold by Piper Aircraft Corp., Lock Haven, Pa., to West Aircraft Co., Paso Dencos. Sky Ranch Airport Denver, Colo. Sales cover an 80-acre Model 108 acres and another 1.5 acres. Operators can order spare parts through Piper dealers, the former owner reports.

New air defense identification zones (ADIZ) planned in USAF Air Defense Command will completely enclose the U.S., phasing service goes.

## cartridge pumps...

here's another reason why original equipment manufacturers should see Posco before making their own pumps

Look for installation of Model 1000 Posco Cartridge Pumps showing solid and solid parts. Pump Model 1000 1 1/2" x 1 1/2" (1000 RPM and 1000 psi). Low weight 1 1/2" x 1 1/2" x 1 1/2" (1000 RPM and 1000 psi). Low weight 1 1/2" x 1 1/2" x 1 1/2" (1000 RPM and 1000 psi).

Look what's happened to hydraulic pumps! Packed into the new cartridge design is a miniature hydraulic pump of advanced design—the Posco Cartridge Pump.

That Posco is recognized across the road for extremely compact pumps. And incorporation into packaged hydraulic or lubrication systems. They are Posco-designed to be integral components of such assemblies, allowing manufacturers of the problem of designing, producing or servicing their own pumps. By giving Posco the responsibility, manufacturers deal with pump specialists having extensive experience. The result—packaged systems that operate better and more dependably are produced with fewer headaches.

Cartridge Pumps have all the outstanding features you would expect to find in a Posco pump including "Pressure Loaded" bearings for longer service life and higher volumetric efficiency. In addition, they require no shaft seals or external plumbing connections and may be mounted in the oil sump. These gear-type pumps operate at pressures to 4,000 psi and speeds to 12,000 RPM.

Can we work with you in designing a Cartridge Pump for your packaged system? Your project will receive the personal attention of skilled engineers to assure a successful solution. For details, write: PESCO, 24300 North Miles Road, Bedford, Ohio.

Posco Cartridge Pumps are the standard for high efficiency, compact and rugged. They are designed to be integral components of such assemblies, allowing manufacturers of the problem of designing, producing or servicing their own pumps. By giving Posco the responsibility, manufacturers deal with pump specialists having extensive experience. The result—packaged systems that operate better and more dependably are produced with fewer headaches.



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BEHLEN JET-SCOOTER, priced at \$6,500 is designed to cruise about 120 mi at 60 mph using a mixture of renewable pressure gas and oil. Fuel tank is detachable so that the jet can be used by changing. Midget, 500 lb. weight, the craft can carry 500 lb. load, starts its engines and looks like a small. Kelly-Dickson August 1978. A 45 hp mounted engine is mounted above the tail of the single 19 ft. motor and drives the two small propellers within the tail. Hindwheels motorized wheels equipped from the tail and under left handwings to make take off and engine speed forward speed is controlled by pulling and pushing the handwheels. Kelly-Dickson reports. Brown also plans to offer the Jet-Scouter in 10 days, priced at \$998. He does not intend whether the craft has been flown. Brown also builds a hand-launched jet.

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"Good will" is the disposition of the physical customer to return to the place where he has been well treated  
—W.S. Symon Court

## NEW AVIATION PRODUCTS



### Profilers For Big Blades

Two new profiling mechanisms have been developed for milling and grinding profiles of large, tapered compressor blades that measure up to 18 in. long by 6 in. wide.

•Style 155 for milling can be used with titanium as well as stainless steel. Work feeds longitudinally across the milling cutter and radially across the rotary cutting stroke. Portion of the blade relative to the cutter is maintained by a steel cam on the work head which engages a follower on the machine base.

•Style 157 grinder uses the same type of cam to control height of the blade in addition to the guiding wheel. But instead of the blade feeding longitudinally, it rotates and feeds across the grinding wheel.

Enc-4040 Corp., 1209 Oakland Blvd., Detroit 12, Mich.

tion which does not require change pins to obtain speeds from 4 to 500 rpm; and an automatic shifter that closes to the 100-ft. travel holder is released from the equipment, reducing possibility of locking during transport.

General Electric Co., Instrument Department, Lynn, Mass.

### Quillscope Has 40 Channels

Large-screen display quillscope features 16 input channels and is used to have approximately 250 sweep accuracy with a system linearity of 1%. Vertical line graph is 9 in. high x 12 in. wide on a 17-in. cathod-ray tube. Each vertical line terminates in a dot for very real accurate reading. Output of each of



the 16 amplifiers is scanned from front to rear.

Frequency response of each channel is within 1% from 10 cps to 10 kc and down to no more than 7 db at 90 db. Each channel is high impedance, single ended with one side grounded. Maximum sensitivity of each channel is stated to be 45 mv. peak for a full 9-in. vertical deflection.

Electronics, Inc., Quillscope Department, 3121 St. Ferdinand Rd., Los Angeles 39, Calif.

### Electromagnet Brakes A.S. Motor

A self-contained die electromagnetic brake is used to decelerate rotating two-terminal homopolar arc motor from 11,760 rpm. to rest in less than one-60th second.

It's coated and fully insulated, the aircraft type motor is available in continuous duty ratings from 1/2 to 1 1/2 hp. and speeds of 5,000, 7,500 or 11,760 rpm. Ratings apply from start to 75,000 ft., die motor says.

Motor weighs 1 1/2 lb., overall length is 3 1/2 in., width is 1 1/2 in. Unit is designed in MIL-M-79993 and is suitable for power input according to Type B of spec MIL-E-7594.

Small Motor Division, Westinghouse Electric Corp., Lima, Ohio.



### Drawing File in Self Indexing

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Model VCA-161-50 weighs 135 lb. tall and has an effective branch length of 12 ft. 10 in. Indicate variation of cutting speeds from 10 to 50 surface feet/minute.

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Small Aircraft Landing Area

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1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 2680, 26

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(Continued from page 9)

Dr. W. J. Strong, chief designer, End wing aircraft, Boeing Airplane Co., Ltd.  
Philip Weiss, Senior Engineer (Chief Design) chief designer, Republic F-105, F-106, F-107, and F-108, and D. J. Rouse, chief designer.

Dr. Angelo Miele, associate professor, School of Aeronautical Engineering, Princeton University, Lafayette, Ind.

Peter J. Rebeck, assistant manager, General Electric Co., a light military aircraft engine development, Westinghouse Electric Corp., New York, research engineer, Office of the Technical Assistant to the Secretary of USAF.

V. B. Riles, assistant engineering manager, executive department, E. Pittsburgh Division, Westinghouse Electric Corp., Pittsburgh, Pa.

John J. Riles, chief engineer, Lockheed Aircraft Corp., Burbank, Calif.

Capt. M. W. Adler, United States Army, flight instructor, Los Angeles, Calif.

George D. Boon, USAF, station school commander, Los Angeles, Calif.

Robert W. Brown, chief manager, Lockheed Aircraft Corp., Burbank, Calif.

Robert T. Manton, manager, West Coast plant of General Motors Corp., Torrance, Calif.

T. M. Riles, director of design and research, Sandhollow Aircraft Section, Westinghouse Electric Corp., Pittsburgh, Pa.

Wendell D. Dine, military contracts and commercial sales representative, General Electric Co., Burbank, Calif.

David H. Robinson, manager, general and aircraft sales, Kaiser Corporation of America, Burbank, Calif.

Harold J. Thibault, assistant engineering director, Tenth Manufacturing Co., Cleveland, Ohio.

George C. Stewart, chief designer for the Lockheed Aircraft Corp., Burbank, Calif.

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[ ] **Check contents and locations of first aid kits.** Be sure they're adequate and up to date. Here again, your CD Director can help—with advice on supplies needed for injuries due to blast, radiation, etc.

[ ] **Encourage personnel to attend Red Cross First Aid Training Courses.**

[ ] **Encourage your staff and your community to have their homes prepared.** Run ads in your plant paper, in local newspapers, over TV and radio, on bulletin boards. Your CD Director can show you ads that you can sponsor locally. Set the standard of preparedness in your plant city. There's no better way of building prestige and good employee relations—and no greater way of helping America.

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## Capital Stakes Its Future on Viscounts

British turboprop transport will equalize position in hard competition with Big Four, Carmichael says.

By Peckle Stever

Washington, D.C.—Equalizer in the still competitive Capital Airlines fleet from the Big Four carriers will be the Viscount Viscount turboprop transport. J. H. "Nipper" Carmichael, Capital president told *Airtransport* Wenz.

Carmichael said that 30% of Capital's business is in competition with American Airlines, Eastern Air Lines, Trans World Airlines and United Airlines, all recently re-equipped.

"The DC-7s and Super Constellation have been hitting us pretty hard by throwing their best at us as it is fairly obvious that they recognize Capital's competition which we take as a compliment," Carmichael said.

"We can and will not schedule to flying times unsupplied by any other argument, particularly in congested airports, smaller instances of the Viscount will make the final difference." The Viscount starts service with Capital July 26.

### Jump on Turbines

Capital expects to exploit probably the advantage of being the first U.S. airline to place turbine-powered engines on a scheduled service. Purchase of the British-built transport is expected to give Capital a floor in low fare jump in fuel fare before U.S. manufacturers can start delivery of turboprop engines. Carmichael said that "Viscount's greatest delivery of 40 Viscounts before any other U.S. airlines could be filed."

Reviewing early service, the *Washington Post* said its editor on the Viscount. "And it is a hope of immediate horizon," Carmichael said.

Capital is going to be the last airline in the world to start a scheduled service, the biggest. The company future as well as its own needs equally on the Viscount. "We are either adults, young or adults right, and I think we are right, in being 68 Viscounts."

The Viscount gets the same two main advantages, according to Carmichael.

- Capital is now up with the leader as far as equipment is concerned. "We have as airplanes that nothing is not as far as we can go."
- Capital will give 90% standardization with the Viscount.

Passenger appeal of the Viscount has been demonstrated in European operations and Carmichael feels the impact on the U.S. touring market will be as successful. The Viscount is a new, exciting airplane that has lots of space, speed, and good public acceptance of the Viscount should have exceeded our loaded hopes.

### Plan of Action

Carmichael says his aim is to consolidate Capital's position in the industry. The two-pronged plan of action:

- Strengthen route structure

Carmichael indicated that Capital may have to Civil Aeronautics Board for help.

"We now must solve the last problem being Capital's weak route structure," he said. Specifically, Capital is seeking access to long haul markets.

"We have as much said to strengthen our present regional short haul operation and I am confident that CAB will grant our application for new routes." At the present time 77% of Capital's revenue are derived from 13 cities in its 75 city route system.

Fortunately, the Board's philosophy has undergone a change from the previous position that protected the long haul transportation carriers by not allowing the regional, limited carrier, Carmichael said. "Capital should use one route, one route as well as the Board becomes convinced that the short haul operator needs the protection of local restrictions and not the main carrier trade."

Capital is involved in three separate cases (see box p. 117).

### Cost Awareness

"We want complete capital costs than anything else," Carmichael said.

"We want to have it until the Board's present imposed restrictions are lifted and route extensions needed. We have to go up to our responsibilities under the statute and I believe the Board will recognize this."

Carmichael agrees his objective with an awareness that there are more obstacles to be overcome. He said that 1958 has been a tough year on his.

Although revenues have actually increased the rise in costs has kept Capital

below the industry's average rate of growth. There is an acute awareness of costs. Capital's 4,600 employees are familiar with Carmichael's statement.

"I've got 50 million worth of new equipment to be paid for."

Capital has trained against an aircraft service in seeking new revenues, although the carrier was a pioneer operator of "trunk" services. Carmichael pointed that Capital will seek further coach expansion. He said today's air coach service is nothing more, than reduced fare transportation which doesn't stand for itself. "The biggest principle of reducing variable equipment and costs during off-peak hours has been lost," he said. "The alternate solution will have to be a reduction in fare class lines."

Big problems, fare battles and equipment difficulties are set now to Capital management. Right now again when the Carmichael administration began, Capital was a "luck" company. Under Carmichael's leadership, Capital is off schedule making money and paying dividends. First dividend was not paid until 1954 and that was in the form of stock.

San Carmichael: "Capital doesn't ask for any preferential treatment and the Viscount doesn't need any."

## Capital Gets Nonstop Norfolk-Atlanta Route

Capital Airlines will operate new nonstop service between Norfolk and Atlanta.

Civil Aeronautics Board denied that a nonstop service between the two southern cities is required and has ruled capital to perform the service over their other airports—Eastern Air Lines, Delta, TWA, Eastern Air Lines and National Airlines.

The two cities are currently served by Capital, but route restrictions make service slow and inefficient. The Board has found that the traffic potential created between 15,000 and 25,000 passengers a year is sufficient to support nonstop service and that the service can be rendered profitably.

### Choice of 8 Flights

Capital Airlines was chosen over the other three applicants for the service because it currently serves both ports and had excess capacity, plus a fleet of 100 aircraft. Representatives of Eastern, National or Delta would have

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## Capital Route Cases

Here are the three major route cases in which Capital Airlines is participating:

- **New York-Chicago Case.** Civil Aeronautics Board examiner W. F. Casida has recommended removal of subsidies to permit Capital's opening, meeting any case between New York-Chicago, New York-Detroit and New York-Pittsburgh, thereby allowing Capital to compete equally before the three pairs of cities. Capital also was recommended for a route between Detroit and New York via Buffalo, Rochester and Syracuse.

- **Northeast-Southwest Case.** Civil Aeronautics Board examiner W. F. Casida, in his report, said that the removal of present route subsidies is also needed and Capital has further asked to close the present existing air routes for Washington-New York weekly service.

- **New York-Florida Case.** Air hearings now underway. Civilian Board ruled Capital's case for case in the Miami market as one of 14 major applicants. He directed Capital often working any other applicant can also plan the route, this will be the Great Lakes case to Florida.

called for introduction of a new route.

The Board also found that selection of Capital promises to have relatively the least overall adverse effect on the other carriers involved.

In its decision, CAB accepts the findings of its examiner finding Capital for the service. Delta and Eastern objected to these findings on the grounds that they could offer Atlantic service to points beyond Atlanta.

The Board says that such adverse impacts would be less important in view of the fact of course that Atlanta will be high volume air traffic.

The examiner found that Capital's member passengers would have a choice of eight different flights at 14 hours to within 30 minutes of their desired service to 24 cities off-airport of this point.

## Less Adverse Effect

Eastern Air Lines is naturally a major participant in Atlanta-Norfolk traffic, although the carrier doesn't want Norfolk directly. CAB finds that Eastern's loss in the market through selection of Capital would exceed Capital's loss if Eastern were chosen, but that Eastern will gain where business at Atlanta from Capital passengers tending to avoid that point.

The net effect of the choice of Capital as Eastern, as well as on National and Delta, is found to be less than the adverse effect on Capital 2 case of the others were chosen.

## Varig Goal: Half U.S.-Rio Traffic

New York-Varig Airlines will try to take at least 50% of the U.S.-Brazilian traffic from American as carriers which it starts scheduled service next month between New York and Rio de Janeiro. If successful, the Brazilian flag line plans to expand its flight facilities, using several other high competitive routes from Atlantic routes.

"New York-Rio has been strictly an American operation and more 50% of the traffic is Brazilian," Varig President Roberto M. Costa told Aeronautics Week. "So we're just trying to take what has belonged to us for a long time. But our operation also will increase volume on the route." The appeal of a new airline will draw new passengers.

"When we digest the New York operation, we'll start thinking about expansion in Europe. We've got to keep expanding. If we stop, we'll be in trouble. To expand, we've got to get new routes."

Varig's first trans-Atlantic service probably will be to Great Britain and France, two European countries that now have bilateral air agreements with Brazil.

The Brazilian airline will start next month on the New York route, flying with three Lockheed L-1011 Super Constellation delivered during the past 10 days. Special winged flights will take off from Rio de Janeiro Jan. 25 and from New York Aug. 7.

The route will go to Ciudad Trujillo, offering direct service between the U.S.

and the Dominican Republic, and extend north from Rio to San Paulo, Montevideo and Buenos Aires.

Passengers will be limited to one roundtrip a week during the first month, but a second is expected in three months. The airline is still in 1966.

Varig L-1011s will cost 40 Brazilian cruzeiros and 15 tourist dollars. Service toward the Super Constellation will be shared toward South America.

U.S. flag airlines have a service that's hard to beat, and Brazil. "We know that, so the only thing we can do is make a service to a certain type of people—Brazilians."

In addition to service on the plane, staff offer meals and other personal aids to passengers while there in New York. Lots of Brazilian don't come to the U.S. because they can't speak English, and most find there was no service.

On board the Super Constellation transport, Varig will offer these special services:

- **Polylongue courses.** Students and students will speak English, Portuguese, German, Spanish, and French.
- **French-speaking meals.** The line will have its own kitchen at each stop and will have meals from Europe to suit them. There will be no French meals on the New York-Rio route.
- **Four drinks.** Passengers will include red wine, liquor, champagne, and one of coffee-Brazilian coffee.

If traffic volume increases is expected.



**First Navy R4Y-1 Loads for Tests**

An engine is loaded aboard Navy's Cut Cutters R4Y-1 for production flight tests prior to delivery. A single-engine transport patterned after the T41, the R4Y-1 can carry 12,000 lbs of payload, 41 passengers, in a stretch-out mode as 17 lie-flat beds. The first of three four-engine piston-powered subsonic transport, can support a load of 300 lb. per square foot. Navy has ordered 50 R4Y-1s.

as the New York route and if trans-Atlantic flights are started. Vane will need new long range transports. Burt indicated the next order will be for several more 100PRs to possibly bring in DC-7Cs.

"In time, we're going over to turbo props," he said, "but the airplane we're looking for is not available. The only long range turboprop is a Bristle's Jetstream, and it's still in the development stage."

"We'll have a turboprop within the next five to six years, but right now we'll stick to the 100PR or the DC-7C."

## Trans-Pacific Wins Five-Year Renewal

Civil Aeronautics Board has declined to renew competition in Hawaiian air transportation by removing the certificate of Trans-Pacific Airlines for five years.

The Board said that the certificate of its decision, which has been approved by President Eisenhower, is the necessary road for competitive air service in the Hawaiian Islands.

In its order, CAB:

- Renewed Trans-Pacific's certificate on Dec. 31, 1959.

- Authorized Hawaiian Airlines' certificate to deliver service to Kona, Hilo, and between points on the island of Maui.

- Extended Goettl Airlines and Andover Flying Service from revenue agreements to permit air taxi operations in Hawaii.

CAB agreed with earlier findings of its agencies that "because under the provisions of the Board's laws, it is in the public interest that only one air carrier would place all transportation facilities in exclusively under the control of one organization."

The Board pointed out that since the Inter-Island Route Navigation Co., HAIL's parent company, terminated passenger service among the Islands in 1946, the inter-island transportation has been by air. Competition of Trans-Pacific's operations, said the CAB, would put HAIL in a complete monopoly position.

CAB concludes that there is sufficient traffic volume in the Islands to support competitive service. Total traffic in January 1959 increased 8,29% over January, 1958, and February traffic was up 1,71% over February, 1958.

In reference to HAIL's contention that restrictions of 1946 has resulted in increasing subsidies, the Board disagreed and said that the record indicates that the increased subsidy burden was the product principally of the economic position of HAIL's management.

## Rothschild Favors \$42 Million Annual Airport Aid for 2 Years

Washington, D. C.—An annual \$42 million federal airport program for the next two years was proposed to Congress by Commerce Under Secretary for Transportation Louis Rothschild. The action means that the Administration has yielded to overwhelming pressure from Congress for an accelerated airport program.

This is a compromise with legislation authorizing \$60 million a year for the next four years, which Rothschild personally feels applied in too many instances the Senate Commerce Aviation Subcommittee (AW June 11, p. 171). Despite the Administration opposition, the measure, sponsored by Sen. Mike Mansfield (D-Mt.) chairman of the Senate Commerce Aviation Subcommittee and Rep. Owen Harris (D-Ark.) chairman of the House Commerce Transportation Subcommittee, was unanimously passed by the Senate (AW Feb. 8, p. 31).

Under the "contract authority" approach, Civil Aeronautics Administration would be able to enter contracts providing federal aid to airport projects and Congress would be obligated to appropriate funds subsequently covering the obligation. Under the 1946 Airport Act, CAA has had to obtain appropriations first.

### Reason for Change

Under the Morrison-Human measure, there would be \$55 million available for airport aid in Fiscal 1956; the \$43 million contract authority—\$60 million for fiscal 1957 and \$1 million for terminal projects plus a \$33 million direct appropriation that has already been approved. Rothschild proposed first the \$78 million be increased a part of the \$42 million program be proposed. Although only half the amount requested in the Morrison-Human bill, the \$43 million direct first years the \$11 million the Administration proposed for Fiscal 1956 in January.

Rothschild explained the Administration's change in the contract authority approach is a general principle, contract authority — is undesirable, because it removes the program from annual budgetary review by the President and the Congress.

"At the same time, we recognize the desirability of greater stability for the airport program," he pointed out. "The program has been given to possible alternative arrangements within the framework of annual appropriations, which would remove the demand about the use of contract authority. At the same time, no completely satisfactory alter-

native of that nature has been developed. Accordingly, upon reconsideration of all of the factors relating to the airport program, the Administration would support, in this particular case, the general principle of advance contract authority, within reasonable limitations as to duration and amount."

### Traffic Growth Factors

He opposed the five-year program, though, in the grounds that the appropriate level of federal aid cannot be determined that far in advance, because of three basic factors: "On the one hand, as traffic grows and new technical developments will tend to increase the cost-of-kind of airport equipment required throughout the country. On the other hand, the same traffic growth should improve the financial results of airport operations, and may therefore make airport operations relatively less dependent upon federal participation."

Rothschild also alerted to that to a percentage of the Senate passed bill. • First, that all types of airports be eligible for aid. This provision is directed at the criteria established by Commerce Department (50) based aircraft to a minimum of 5,000 employees annually, and which the number of projects eligible for aid was reduced from 5,000 to 2,750. Rothschild maintained that Commerce Department must have discretionary authority to determine eligibility of airport development is to be according to a "contract" plan.

• Second, that federal aid be available for terminal facilities.

"There should have a low priority on federal funds, and it should be determined with the Commerce Department whether to make grants. Rothschild maintained. He pointed out that "track and bus terminals and transportation are not really new to the field of airport operations, of these other services as airport terminal buildings and air transportation. But the federal government, while participating in the construction of highways and in the construction of water and bridges, does not accept responsibility for the development of the necessary terminal facilities in these fields."

## Lufthansa Buys C-47

Lufthansa has purchased a third Douglas C-47 in France for conversion to passenger operations supplementing its four C-47s. A C-47 used by Lufthansa in a civil mission is also expected to be converted later for passenger service.

## Handling heat exchange problems on the hottest jobs in the air!



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## Airline Traffic—May 1955

	Enroute Passenger	Revenue Passenger- Miles (RPM)	Enroute Passenger Load Factor	U. S. Mail Ton-Miles	Express Ton-Miles	Freight Ton-Miles	Total Revenue Ton-Miles	Per Cent Revenue in Airports Ton-Miles
<b>DOMESTIC TRAILER</b>								
American Airlines	643,482	368,365	66.19	1,510,805	886,818	9,143,754	48,704,708	57.83
Boeing Airlines	144,857	83,804	82.14	184,981	703,634	331,125	5,268,605	55.83
Capital Airlines	285,154	70,073	56.84	273,440	808,818	990,331	7,418,384	47.26
Continental Airlines	36,184	5,532	33.99	13,367	6,997	90,595	331,210	48.31
Delta-C & S Air Lines	34,003	16,880	54.90	80,456	25,383	125,612	5,999,911	47.80
Eastern Air Lines	181,555	40,735	67.70	253,308	308,588	565,876	8,246,499	60.03
Northwest Airlines	548,372	218,499	61.68	818,701	436,801	1,050,323	58,495,134	48.48
National Airlines	80,893	40,519	83.17	219,812	46,710	353,851	6,765,085	65.54
Midwest Airlines	40,621	6,765	53.69	1,694	13,401	33,318	198,697	19.81
Northwest Airlines	19,874	7,100	32.43	348,818	807,637	387,113	8,111,947	43.03
Texas World Airlines	387,476	836,543	65.76	1,078,468	1,041,279	1,081,823	56,860,324	60.46
United Air Lines	476,504	371,701	65.97	1,890,635	947,638	1,480,814	37,073,247	57.48
Western Air Lines	91,364	42,965	55.57	718,963	67,845	830,685	4,409,336	32.11
<b>LOCAL SERVICE</b>								
Allegheny Airlines	20,385	4,871	44.83	6,573	14,351	9	429,334	44.72
Boeing Air Lines	8,675	7,870	30.68	2,194	1,887	5,099	190,444	37.07
Capital Airlines	8,413	1,376	27.17	3,870	1,430	4,755	135,079	55.13
Frontier Airlines	14,807	3,887	43.68	14,675	7,417	64,842	410,217	33.86
Lake Central Airlines	10,074	1,277	36.84	2,555	9,857	754,477	1,744,777	33.50
Midwest Airlines	23,338	4,150	61.66	4,589	5,313	6,902	41,599	66.68
North Central Airlines	32,980	1,946	40.09	18,513	21,854	628,864	628,864	64.50
Omaha Air Lines	99,403	3,397	38.16	6,394	71,824	334,907	334,907	38.78
Prophet Airlines	33,445	6,314	33.50	7,851	9,876	13,753	646,589	50.80
Southern Airways	15,081	5,201	46.81	8,668	17,349	9	378,466	43.77
Southwest Airways	21,485	4,466	34.90	6,445	4,365	13,020	449,459	33.64
Texas World Airways	13,880	3,710	39.42	11,725	6,620	10,669	319,643	38.70
West Coast Airlines	70,793	3,114	43.18	3,808	8,768	8,473	574,539	46.54
<b>INTERNATIONAL</b>								
Boeing Airways	3,660	6,790	45.26	88,608	9	86,873	813,688	46.53
Delta-C & S Air Lines	3,871	4,680	49.47	4,760	28,300	341,453	341,453	38.12
Frontier Air Lines	14,810	95,046	68.64	56,014	100,409	9,076,848	9,076,848	58.38
Midwest Airlines	7,868	15,369	30.04	775,235	10,189	978,336	2,056,450	66.31
Pan American World Airways	6,022	9,484	61.12	37,390	311,866	1,520,141	1,520,141	49.02
Alaska Airlines	13,618	95,777	65.42	885,796	1,800,797	11,584,471	11,584,471	49.07
Latin America	74,675	74,672	29.83	386,488	8,379,067	93,012,246	93,012,246	58.11
Pacific	17,980	57,644	64.08	7,099,187	7,099,187	8,379,067	8,379,067	48.25
Pan American-Grace Airways	102,449	19,703	18.34	40,830	204,368	1,666,497	1,666,497	54.83
Texas World Airlines	87,949	56,573	70.81	6,09,918	662,356	98,537	3,053,210	70.18
<b>HAWAIIAN CARRIERS</b>								
Hawaiian Airlines	89,576	3,073	59.32	4,803	189,704	473,406	473,406	50.15
Texas-Pacific Airlines	14,008	7,812	49.63	986	98	8,736	104,714	82.53
<b>CARGO LINES</b>								
Phone Type Lines	1,193	3,773	83.04	3,498,838	3,498,838	3,498,838	3,498,838	68.63
Seattle Airlines	1,056,204	3,093,264	4,008,990	4,008,990	4,008,990	4,008,990	4,008,990	70.56
Stik Airways	139	140	99.79					

Compiled by AVIATION WEEK from figures reported by Civil Aeronautics Board.

## DC-3 Pilot Blamed in Collision

The pilot of an executive DC-3 which collided with a Trans World Air Lines Martin 2-0-2A has been blamed for the accident by the Civil Aeronautics Board.

CAB listed that the probable cause of the accident, which occurred near Cincinnati, Ohio, Jan. 17, 1955, was operation of the DC-3 in the Cincinnati control zone in unknown traffic with out clearance, near the base of, or in the vicinity.

The collision occurred about two months after taking of the FVA

Martin from Charles Cawson with one pilot.

The DC-3, owned by Conkleton, Inc., was flying without flight plan from Battle Creek, Mich., to Lexington, Ky., and was not known to be in the area by the Cincinnati tower. The two collided, killing both crews and all ten passengers aboard the FVA flight.

The CAB report stated that the DC-3 pilot had been backed on number conditions at Battle Creek and knew weather would become marginal along the route. "Since the flight was con-

ducted without flight plan, no weather conditions which became poorer, and without communicating with any station enroute, it is considered that he failed to exercise reasonable judgment and controlled the operation without in good operating practices," the report said.

Good judgment would have dictated in light of the weather situation, that the flight should have been planned and conducted to avoid flying at low altitudes in marginal VFR conditions.

"The DC-3 was operating in the control zone without being cleared to do so by air traffic control. Since the ceiling was less than 1,000 feet, this clearance was required."

"The DC-3 was equipped with ground transmission and receiver. It is therefore considered remote that fatal radio failure could have occurred," CAB stated.

## Prop Pitch Indicator Deadline Extended

Extension of the deadline for installation of propeller versus pitch indicators has been proposed by the Bureau of Safety Regulation of the Civil Aeronautics Board.

In October, 1954, the Bureau of Safety Regulation ordered installation of a device on aircraft with reversible pitch propellers which indicates to the pilot when the propeller is in reverse pitch.

The installation was to have been completed Sept. 1, 1955, but some airlines have been found unable to meet the deadline.

A Civil Aeronautics Administration report indicates installation can be completed by Apr. 1, 1956, and BSA, in an extension of the deadline to that date.

## CAB ORDERS

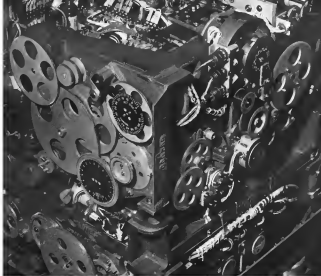
(from 30 to July 6)

### CRANTED

United to learn permission to serve ETS, Nevada, through Yellow Field.

Capital Airlines an exception to permit sale of their DC-4s owned in Los Angeles Air Service and three DC-4s aircraft to Seattle before end to permit temporary lease back to Capital of their Seattle aircraft and two of the Los Angeles Air Service aircraft.

Moback Airlines a temporary exception to operate direct service between Chicago, N.Y. and Miami N.Y. for two years, provided all flights between Dallas



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### 'C&O' for Progress'

Chesapeake & Ohio Railway has taken to the air.

The railroad last week leased a DC-3 from Capital Airlines for a one C&O President Walter J. Tuckey said it "will enable our officers to cover more efficiently more than 1,800 miles of railroad operations extending from Washington, D. C., and Virginia to Cincinnati, Chicago, Michigan, Wisconsin and Canada." The plane is being fitted with dual typewriter and other equipment to make it an aerial version of the railway office car. It will be painted blue and yellow, the C&O colors, and the name will carry the line's slogan: "C&O for Progress."

Tuckey added: "C&O officers will travel by train as well when that is the best way to go."

or Baltimore and others stop at two in transatlantic points.

### ORDERED

Eastern Air Lines authorities intended to increase the schedule which permits service to Phoenix, S. C. and Columbia, S. C. on the new flight.

Eastern Airlines' transport and rate level at 50.75 cents for international operation and at the domestic schedule rate for domestic operations. Both rates apply to general starting January 1.

United Airlines announced to expand service at Elko, Nevada from July 5 to August 29, 1957 during winter season, including at Elko Mountain airport.

Winn-Moore Airlines will not respond in July 1, 1957, and was ordered to show cause why the Board should not suspend and rate for the carrier of 110.00 cents for the period July 1, 1957 to October 31, 1957, 175.00 cents for November 1, 1957 to April 30, 1958 and the like on a month period in each succeeding year, and 180.00 cents for May 1, 1958 to October 31, 1958 and the like on a month period in each succeeding year.

Golden Airways dual rate proposed as at July 1, 1957 and Golden is ordered to show cause why the Board should not set temporary dual rates for the carrier of 100.17 cents for the period July 1, 1957 to October 31, 1957, 270.00 cents for November 1, 1957 to April 30, 1958 and the like on a month period in each succeeding year, and 100.17 cents for May 1, 1958 to October 31, 1958 and the like on a month period in each succeeding year.

CableAirline Airlines' dual rate proposed as at July 1, 1957 and CableAirline is ordered to show cause why the Board should not set a temporary dual rate for the carrier of \$1.35 per ton code.

### DISMISSED

Western National Airways' petition to stop the road is the Trans-Atlantic

Cargo One and its status for regulation between and duration of service, in view of the President's recent approval of the CAA decision to regulate between and between carriers.

Northwest Airlines' application for certification of temporary authority to serve Texas. Kees, senior the President and the CAA have subsequently approved the case as the Texas-Bureau case.

### DISMISSED

Mohawk Airlines' application for an air certificate to serve Glen Falls, N. Y.

Colonial Airlines' petition for recognition of a CAA order allowing Colonial as a company to operate between Glen Falls, N. Y. and Syracuse.

North Central Airlines' application for an exemption to operate between Detroit and Erie, Pa.

## SHORTLINES

✓ Air India International has added a weekly Thrift class. New service to its London-Rome route, and an other extra flight has been added between London and Bombay via Dusseldorf, Zurich and Beirut.

✓ Alghazary Airlines Inc. 5,990,000 passengers in 1956, an increase of 45% over the previous year. The carrier flew 31.7 million passenger-miles in the first 9 months of 1957, a 15% increase over the last half of 1956.

✓ Heston-Clair Air Transport, English carrier, inaugurates all cargo service between the United Kingdom and Africa July 25. A minimum company, Heston-Clair African Airways, has been set up to develop local air cargo traffic in Central Africa.

✓ North Central Airlines claims as its charter record of 43,677 passengers carried in just 10 days of service in excess of 51% over June 1954.

✓ Shell Airlines began carrying surface mail June 28 with a flight from Chicago to Washington. The cargo line has scheduled 16 flights a week between Chicago and Washington and Chicago and New York, carrying both mail and freight.

✓ Shell has opened a 59 stations from one contract with Shell Oil Co. for surface gas.

✓ Pan American-Grace Airways will inaugurate a new service to South America Aug. 1 with new DC-7s. The new Pacific aircraft are equipped with another major and will be scheduled for 151 between Miami and Buenos Aires.

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## The 'Minimum' Myth

The condition known as "all traffic light" has been widely sought for more a long time—it has almost become a part of aviator mythology. One of the recent fables in connection with the subject might be called the "Myth of Constant Progression."

This refers of course to the continued drop in landing minimums in feet, feet, notwithstanding older laws 400-foot ceilings and one mile visibility down to 100 and 2, over recently to 200 and 1 and the old hand down to 100 and 1.

It all sounds so clean and simple... just as if it were practically possible. And indeed it might be—just might—if the tools required for the job would get better by the same progression.

### Instruments Not Precise Enough

But this is not the case. While we being asked to do an infinitely more precise job with the same old—and in some cases worse—anciently supplied tools. The reference is of course, to the gross inaccuracy of the instrument approach—the instruments themselves.

The cause for precise measurement has invaded every part of American technology and has made possible some outstanding progress. From Palomares probing looms, probes are being driven to the surface of the atom via the electron microscope. A life thousands of miles and a millionth of a second an uncomparable yardstick, measurements today.

Despite the modern "bits splitting," which in the cockpit must certainly serve at stations with an accuracy greater than their tools can measure. Can this be called modern service?

The question looks down to the fact that there is no adequate set of specifications for instrument approaches. The Civil Air Regulations list some required items (and some others add to this) but the terms of needed operational accuracy, is actually needed.

Some columns back (AWE May 7, p. 54), the need for precise flight instruments was mentioned. Nowhere is this more important than on a low approach. But nobody specifies WHAT accuracy is needed for each second-longer lower minimum. An average compass might suffice down to 500 feet or so but it certainly is not stable enough to go to 100 feet. Well, what stability is needed, how many degrees and how much lag can be allowed at such altitudes?

The aircraft is known to suffer from hysteresis and to be heavily loading last decades of modern precision instruments. There has been no substantial improvement in this regard for years but the instruments have dropped considerably. At 200 feet there are not as many as 100 feet each even.

Under a critical situation is almost as bad. Some modern instruments which are put even dropped to show level right after a bank in only less than 20 minutes. This tool used at 200 and 1.

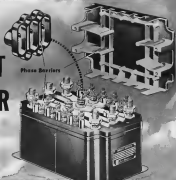
### For Better Instrument Approaches

To be sure, other things must also be considered in the subject of instrument approaches.

For instance, aircraft stability, landing speeds, crew training and coordination, navigation facilities, go-around characteristics of the aircraft, runway length and obstructions, and naturally the all-important visual aids (including the visibility when extending reach a mile from the runway centerline) and many other things are vital factors.

But it does seem that a complete set of standards is needed. This would give the industry something solid to work from. It might even be called "A Handy Guide to Instrument Approaches."

# NEW CIRCUIT BREAKER FOR A-C SYSTEMS



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This new Jack & Heintz Model 50065 Circuit Breaker is designed to meet NEMA-C43779A (450) ... provides a continuous rating of 175 amperes (60 kv) ... weighs but 4½ pounds! Although an important part of the complete Jack & Heintz ac system "package", it can be supplied as an individual unit if desired.

In addition to its main features described at right, this new breaker has many others that assure positive, trouble-free functioning under extreme environmental conditions. Here is another example of how Jack & Heintz continues to provide you with advanced electric systems and components through integrated engineering and manufacturing. For complete information write to Jack & Heintz, Inc., 17635 Broadway, Cleveland 1, Ohio (Export Department, 11 E. 90th St., New York 36, N.Y.)

### SAFETY FEATURES

- **Solid Copper Bus Bars**  
All bus bars are of solid copper. No brittle copper bracing used.
- **Metal-to-Metal Phase Isolation**  
Strength through pin design of main conductors together with phase barriers permits complete mechanical phase isolation of all main conductors and contacts.

### MAINTENANCE FEATURES

- **Easy Contact Inspection**  
As shown above, the special construction allows inspection of main contacts without disassembly.
- **Nylon Terminal Cover**  
Molded of high impact nylon, this cover can be removed easily by loosening four screws.
- **Accessible Auxiliary Contacts**  
All three connections for such auxiliary contacts have been brought out to the terminal points for ease of hookup.

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## Research Must Keep Good People

There are many encouraging signs in Washington this summer that the White House, the Pentagon and the Congress are recognizing the vital role of basic research in a fourfold role: the development, production and operation of superior aerial weapons. The expansion and acceleration of USAF research programs through its Office of Scientific Research (see page 12) is another significant step in this direction.

However, the successful operation of military research and development programs requires an adequate number of technically qualified officers to maintain intelligent liaison with the civilian scientific community and private industry. During the last five years there has been a steady drain of this type officer from the services into private industry—some lured by higher pay and better opportunities and some propelled solely by disgust with the lot of the technically specialized officer in the military services.

Excerpts from the following letter received from a technically well-educated, pilot pilot who served in technical and research and development posts for many years and who is well known to the staff of *Aerospace Week* sheds some light on this problem.

"Congratulations on your recent editorial about *Research and Development*. I refer particularly to the last paragraph of your editorial of June 6, on the need for 'retention' of USAF and Navy engineers.

It was because of this lack of recognition that a number of contemporaries and myself recently resigned our regular USAF commissions. Mine, like myself had post graduate degrees in aeronautical engineering but just could not cope with the WPA type of management at AFSC and AFMCC. I left the regular Air Force after 20 years of service and took a job paying me simply because of complete professional frustration.

"I am not so vain as to imagine that my departure was an accidental event but it may be useful to your cause to get a list of those technically trained officers that have left the regular USAF from Hines Shepherd to the present. These you will find the cadre of intelligence and vitality that the USAF now needs in its technical race with the Soviet Air Force.

"Then you might ask these protest officers who, over the past ten years, were supposed to supply the aspira-

tions and leadership that would have captured the entire mass and respect of this lost institution, to render an account of their negligent stewardship.

"In any case, keep up the good work."

This is a serious problem for the Air Force and Naval aviation leaders as they accelerate and expand their research efforts to keep well ahead of their Russian challenges. Many of the top level research and development officials are acutely aware of this problem and are working hard to make a technically specialized career more attractive in the services.

In the past the technical catalyst specialist has suffered professionally in comparison to the 'jack of all trades' type of line officer that got the steady promotions and the top commands. A good example of the effort being generated by some segments of USAF to provide recognition for younger, technically trained specialists is the picture reproduced here of Lt. Col. Vincent T. Ford being awarded a Legion of Merit by USAF Under Secretary James Douglas. "Vince" Ford, a combat veteran of World War II, is typical of the younger generation of USAF officers who have acquired a fine technical background and who have been working effectively in research and development since World War II.

The Legion of Merit award was in recognition of his work on the Atlas intercontinental missile project as executive to the Technological Capabilities Panel of the Scientific Advisory Committee to the President of the United States and as executive to USAF's special assistant for research and development. It is encouraging to see young technical specialists such as "Vince" Ford receive official recognition from the Air Force. But this type of recognition is only a beginning toward solution of the grave problem of keeping good, technically qualified specialists in USAF and the Navy as career officers.

—Robert Hots



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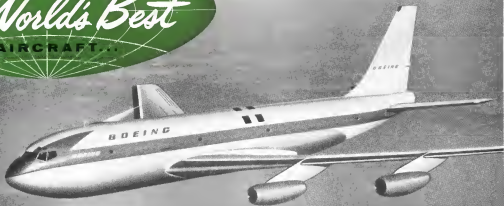
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